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ASSESSMENT OF CONTAMINATION FROM LEAKS OF HAZARDOUS MATERIALS IN THE SANTA CLARA GROUNDWATER BASIN

205j REPORT

Cooperative Report By:
San Francisco Regional Water Quality Control Board
SEEHRL, University of California, Berkeley
Santa Clara Valley Water District

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WATER DISTRICT
5750 Almaden Expressway
San Jose, California 95118

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San Francisco Regional Water Quality Control Board

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POLICY ADVISORY COMMITTEE

TECHNICAL ADVISORY COMMITTEE

CITIZEN ADVISORY COMMITTEE

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I.INTRODUCTION

During the past two years the California Regional Water Quality Control Board, San Francisco Bay Region, has identified over 100 incidents of hazardous material leakage (i.e., industrial solvents) from underground facilities (i.e., tanks, sumps, pipes etc.). The largest number of incidents have occurred in the electronics related industry located within Santa Clara County. However, the problem is believed to be common to all types of underground chemical storage and handling facilities. Hazardous materials involved in these incidents have included many industrial solvents such as trichloroethylene, trichloroethane, tetrachloroethylene, and chlorinated benzenes. In most of the cases, groundwater has been polluted. In at least three cases the contaminants have reached public drinking water supply wells.

Because of the nature of many of these chemicals and the locations of the leaks within a groundwater basin used as a major public water supply, the Regional Board has required detailed investigations at all sites. A large amount of data is being generated through routine case handling procedures. The lateral and vertical extent of pollution, the potential for migration of contaminants, and the best control and cleanup strategies are being determined for each site. There is a need to determine the relative threat to groundwater supplies from each of these leaks in order to concentrate the limited, available resources on the most urgent problems.

Based on the information that is now available, it appears that detectable levels of synthetic organic chemicals above background levels are present in soil and shallow groundwater beneath many, or even most, industrial sites. It is becoming quite evident that neither the Regional Board nor our society in general can afford to investigate and clean-up all contamination to levels of detection. Therefore, a critical need has developed for a risk assessment methodology to determine which sites should, in fact, be required by regulatory agencies to spend money on investigation and/or clean-up.

In response to these findings and needs, the San Francisco Bay Regional Water Quality Control Board received EPA Funds under the 205J Grant Program to embark upon an 18 month study which began in April 1984. The study was a cooperative effort between the Regional Board, the School of Public Health at the University of California, Berkeley and the Santa Clara Valley Water District. The purpose of the study was to develop a risk assessment methodology which permits the objective rating and ranking of hazardous material pollution sites in terms of their groundwater pollution potential. Additional objectives of the study included the development of a uniform data base for sites with pollution located within the Santa Clara Valley groundwater sub-basin and application of the assessment methodology to these sites. A final objective of the study was to present the results in a manner that could be used by the Regional Board to make future decisions regarding the screening of new sites.

A discussion of the assessment methodology is contained in Section II of this report. The data required to apply the assessment methodology includes:

- -Information on the hyrogeology of the basin,
- -Information on the magnitude of site contamination, and
- -Information on the physical and chemical properties and the toxicity of the contaminants found.

A discussion of the subbasin hydrogeology is contained in Section III of this report. In order to fulfill the remaining two data requirements, summaries of the site pollution problems and of the physical and chemical properties and toxicity of the contaminants were prepared. These data summaries are contained in two separate technical appendices to this report entitled "Technical Appendix: Case Summaries" and "Technical Appendix: Chemical Summaries."

Case summaries were prepared for a total of 118 sites located in the Cities of Cupertino, Los Gatos, Milpitas, Mountain View, Palo Alto, San Jose, Santa Clara, and Sunnyvale. Preparation of these case summaries involved a significant cooperative effort between industry, their consultants, and the project staff. One hundred and five (105) of these sites have some level of soil and/or groundwater pollution. While the case summaries contain information on the number and types of tanks, site hydrogeology, contamination, case chronology and, to a limited extent, information on mitigation measures, they are not intended to represent a complete status report of site investiagtion or clean-up.

Because of the large number of sites to be reviewed, the effort necessary to prepare the data base and conduct the assessments was quite significant. Therefore, the sites were separated into two groups. The first group of sites reviewed include those in the cities of San Jose, Santa Clara, and Sunnyvale. The data bases for these sites, generally, include data collected through November 1984.

The second group of sites include those located within the Cities of Mountain View, Milpitas, Palo Alto, Cupertino, and Los Gatos. The data bases for the second group of sites, generally, include data collected through May 1985.

Application of the assessment methdology results in 1) a numerical ranking of the sites, and 2) a graphical representation of the site scores. For the purpose of assessing the risk these sites pose to groundwater, worst case contaminant levels were used. The results of the numerical ranking and graphical plots are discussed in Section IV of this report. The results of the assessment indicate that the sites which resulted in the contamination of public water supply wells or which are in a sensitive area of the basin and involve a large volume of a toxic chemical present the greatest risk. In addition, sites that were previously screened out by the Regional Board staff as not having to undertake any additional work at the present time presented the lowest risk. Review of these results indicates that the assessment methodology adequately predicts which sites present the highest degree of risk to groundwater.

In order to utilize the assessement methodology for the screening of new sites it is necessary to define zones of risk which correspond to the degree of problem seriousness. This concept as well as an attempt at defining three zones, based on the sites rated within the Santa Clara Valley groundwater basin, are presented in Section V covering Risk Management.

Also contained within Section V is a description of the development of a basin sensitivity map for the Santa Clara Valley groundwater sub-basin. The term basin sensitivity is used to indicate the likelihood of, and degree to which groundwater resources may be polluted at a particular location within a groundwater basin. The map presented in Section V represents a graphical means for depicting local groundwater useage, and areal geology and hydrogeologic features. The sensitivity map can be useful in establishing priority areas where contaminant source identification, and permitting and inspection of existing industrial facilities are important. It may also be useful in planning the location of new facailties.

II. RISK ASSESSMENT

Over the past several years there has been an increase in public awareness of the value and the vulnerability of groundwater resources. This increase in awareness has resulted in the identification of numerous cases of existing or threatened contamination of groundwater with toxic chemicals. Regulatory agencies charged with protection of the groundwater resources must often make judgments concerning the degree of risk associated with these sites on the basis of insufficient information. The risk assessment approach described herein provides a method of ranking the threat to groundwater from a number of sites relative to each other on the basis of a limited set of data for each site. It also provides some indication of the magnitude and severity of site contamination in a more absolute sense.

The methodology identifies and assigns values to the factors that are normally considered subjectively in ranking sites. These are generally divided into two groups: site sensitivity factors, which determine the susceptibility of a site to groundwater contamination; and contamination severity factors, which determine the severity and potential to cause groundwater contamination. Each factor is assigned a numerical value or a range of values depending on the degree of uncertainty associated with that factor. These individual values are summed for both groups. The two resulting sub-totals are then added to obtain the contamination potential score which is used to rank sites relative to one another. Alternatively, a risk matrix can be constructed by plotting the site sensitivity score versus the contamination severity score to obtain a graphic representation of the ranking results.

RISK ASSESSMENT METHODOLOGY

Categorizing chemicals and sites on the basis of hazard posed is not a novel concept. Several methods have been developed. These include formal classification systems as well as rank-order models (1). These methods are based on determining relative risks rather than calculating specific risk values. The ranking of hazardous waste sites needing remedial action under the Compensation and Liability Act of 1980 (CERCLA) and the techniques used for assessing risks associated with specific wastes under the Resources Conservation and Recovery Act (RCRA) are examples of this approach. The use of such assessment techniques is attractive, since risk ratings for different situations can be compared on the basis of common criteria without resorting to extrapolation models and their associated uncertainties.

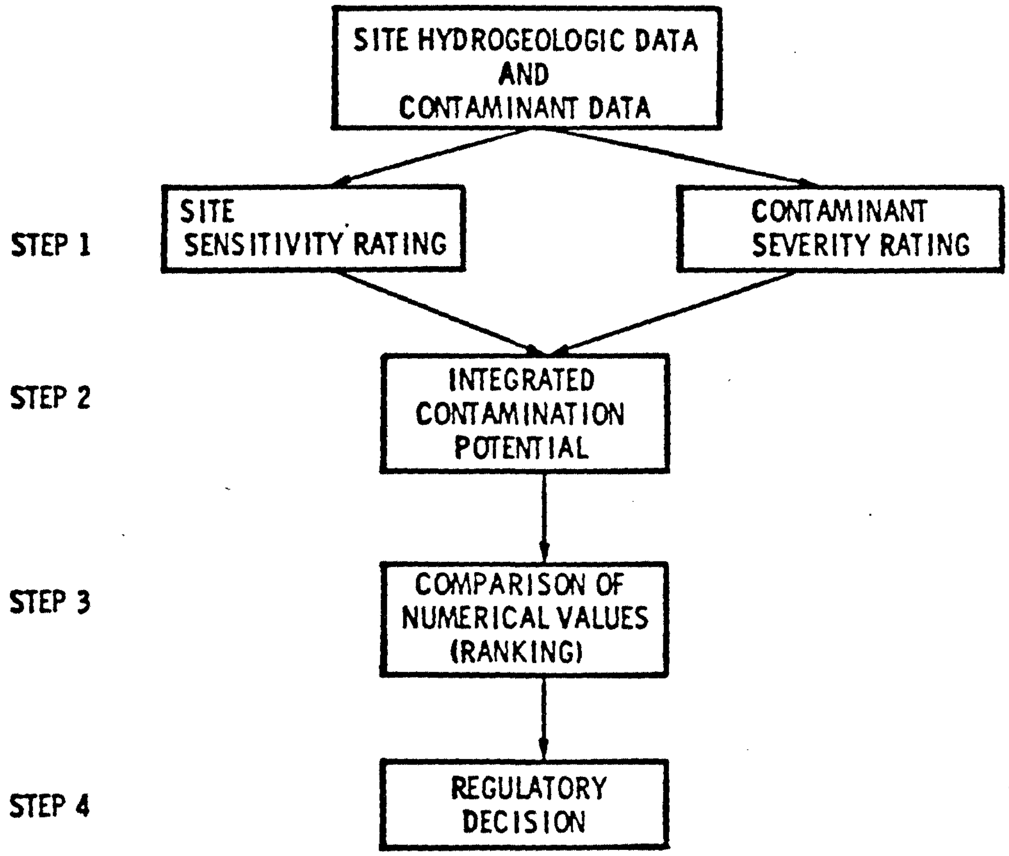
Based on these previous systems and models, a risk assessment procedure for the numerical rating and ranking of hazardous material contamination sites in terms of their relative groundwater contamination potential is proposed. The conceptual approach is based on previous work by LeGrand (2).

The key objectives of the assessment procedure are as follows:

1. Optimize the use of existing data;
2. Concisely describe the hydrogeologic site conditions;
3. Concisely describe the extent of soil and groundwater contamination;
4. Relate hydrogeologic site conditions and the severity of contamination;
5. Identify uncertainty in the data so that additional investigation can be initiated where appropriate to minimize this uncertainty;
6. Put the hazard potential of the site in perspective.

As shown in Figure II-1, the numerical rating system is divided into four steps. In the first step a standardized hydrogeologic description (rating) of the site and a rating of the degree of contamination severity at the particular site are completed. Step 2 involves integrating the site sensitivity and the contaminant severity ratings into a single value indicating the degree of seriousness of the contamination. In step 3, the relative risk of contamination for a specific site or group of sites can then be identified by comparing the numerical values or ranking of the sites.

The first three steps discussed above involve risk assessment while the last step involves risk management. Risk assessment is defined as the compound measure describing the probability of an adverse event occurring and the severity of such an event. Risk assessment involves the process of making estimates that particular adverse events will occur in a given time period. Risk management, in contrast, involves social value judgments as to what level of risk is acceptable. Once the risk assessment steps are complete, regulatory decisions regarding appropriate clean-up actions (risk management) can be made based on the ranking developed (step 4). This last step involves many factors beyond development of the above quantitative assessment results. Uncertainties in the data, value judgments, and political factors enter into the decision makers risk management decisions.


SITE HYDROGEOLOGIC DATA AND CONTAMINANT DATA
STEP 1
SITE SENSITIVITY RATING
CONTAMINANT SEVERITY RATING
STEP 2
INTEGRATED CONTAMINATION POTENTIAL
STEP 3
COMPARISON OF NUMERICAL VALUES (RANKING)
STEP 4
REGULATORY DECISION

FLOW CHART OF RISK ASSESSMENT PROCEDURE

FIGURE II-1

The following sections identify the important factors used for rating the sensitivity of a site and for rating contamination severity. Sections are also included which cover application of the assessment procedure as well as discussion of limitations of the approach.

SITE SENSITIVITY

There are many hydrogeologic factors which control the behavior of contaminants in the ground. The approach used here identified readily available hydrogeologic factors and uses them in a practical, straightforward manner to obtain a preliminary estimate of the importance and vulnerability of the groundwater resource at a specific location. Four broad categories were identified. These include: (a) distance to water use; (b) intensity of present water use; (c) depth to water table(s); and (d) water table gradient.

Within these broad categories, a rating scale was constructed for each of a total of 15 specific hydrogeologic or water use parameters (see Table II-1). The range of values on the scales approximate those expected to be encountered in application of the procedure. The range of the associated rating scale is a function of the weighting assigned to the category and the number of factors within the category. As shown in Table II-2, a total of 240 points were assigned to 24 scales. These were basically split between the site sensitivity (54%) and contaminant severity (46%) categories. The relationship between values and scores for each factor is subjective but reflects the general state of knowledge of these relationships as well as the authors' scoring of specific individual points on each scale. Brief descriptions of the hydrogeologic factors used to determine aquifer sensitivity are presented below and shown in Figure II- 2 through II-4.

Distance to Point of Water Use

The susceptibility of an existing water use decreases with distance from the contaminated zone. As noted by Young, (3) some of the factors which attenuate groundwater contamination with distance include dilution, sorption, decay, and sometimes a decrease in the relative significance of any mounding at the source of contamination and/or drawdown at the point of use. Three separate rating factors were included in this group. The scales as shown in Figure II-2, assign scores for distance to nearest public well downgradient, nearest public well not downgradient, and distance to nearest private well downgradient.

Intensity of Present Water Use

A number of scales, as shown in Figure II-3, were developed to reflect the intensity of existing water use. Included in this group are: scales for estimating intensity of use through the volume of water pumped from wells in the downgradient square

TABLE II-1

SITE SENSITIVITY SCALE FACTORS

- DISTANCE TO POINT OF WATER USE (3 Scales)
    - Public Well Downgradient
    - Public well not Downgradient
    - Private Well Downgradient
- INTENSITY OF PRESENT WATER USE (4 Scales)
    - Population Served Estimate
    - Number of Public Wells
    - Number of Private Wells
- DEPTH TO GROUNDWATER (7 Scales)
    - Shallow Groundwater
    - Existing and Potential Supplies
    - Permeability of Three Zones (Barriers)
    - Conduits for Potential Contaminant Migration
- GROUNDWATER TABLE GRADIENT (1 Scale)

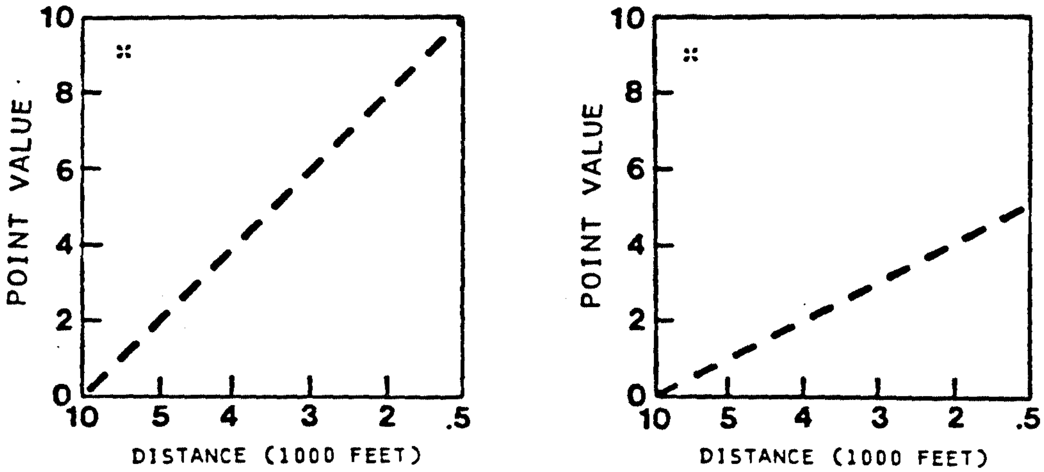
TABLE II-2

SCALE FACTOR WEIGHING

SITE SENSITIVITY	TOTAL POINTS	% OF TOTAL
- DISTANCE TO POINT OF WATER USE (3 SCALES)	25	10
- INTENSITY OF PRESENT WATER USE (4 SCALES)	35	15
- DEPTH TO WATER TABLES (7 SCALES)	60	25
- GRADIENT OF SHALLOW WATER TABLE (1 SCALE)	10	4
	130	54
CONTAMINANT SEVERITY		
- TOXICITY (3 SCALES)	30	13
- PHYSICAL/CHEMICAL PROPERTIES (2 SCALES)	20	8
- MAGNITUDE OF CONTAMINATION (4 SCALES)	60	25
	110	46
TOTAL POINTS	240	100

FIGURE II-2

DISTANCE TO POINT OF WATER USE

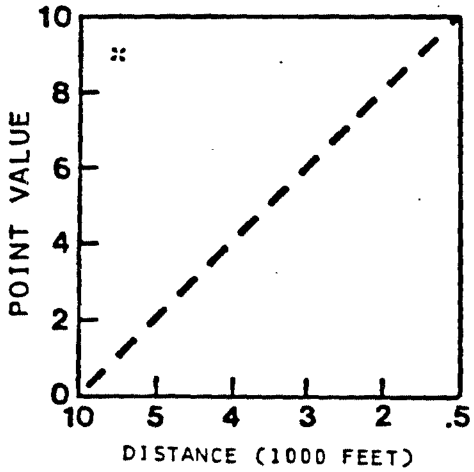


SCALE 1

NEAREST PUBLIC WELL DOWNGRADIENT

SCALE 2

NEAREST PUBLIC WELL NOT DOWNGRADIENT

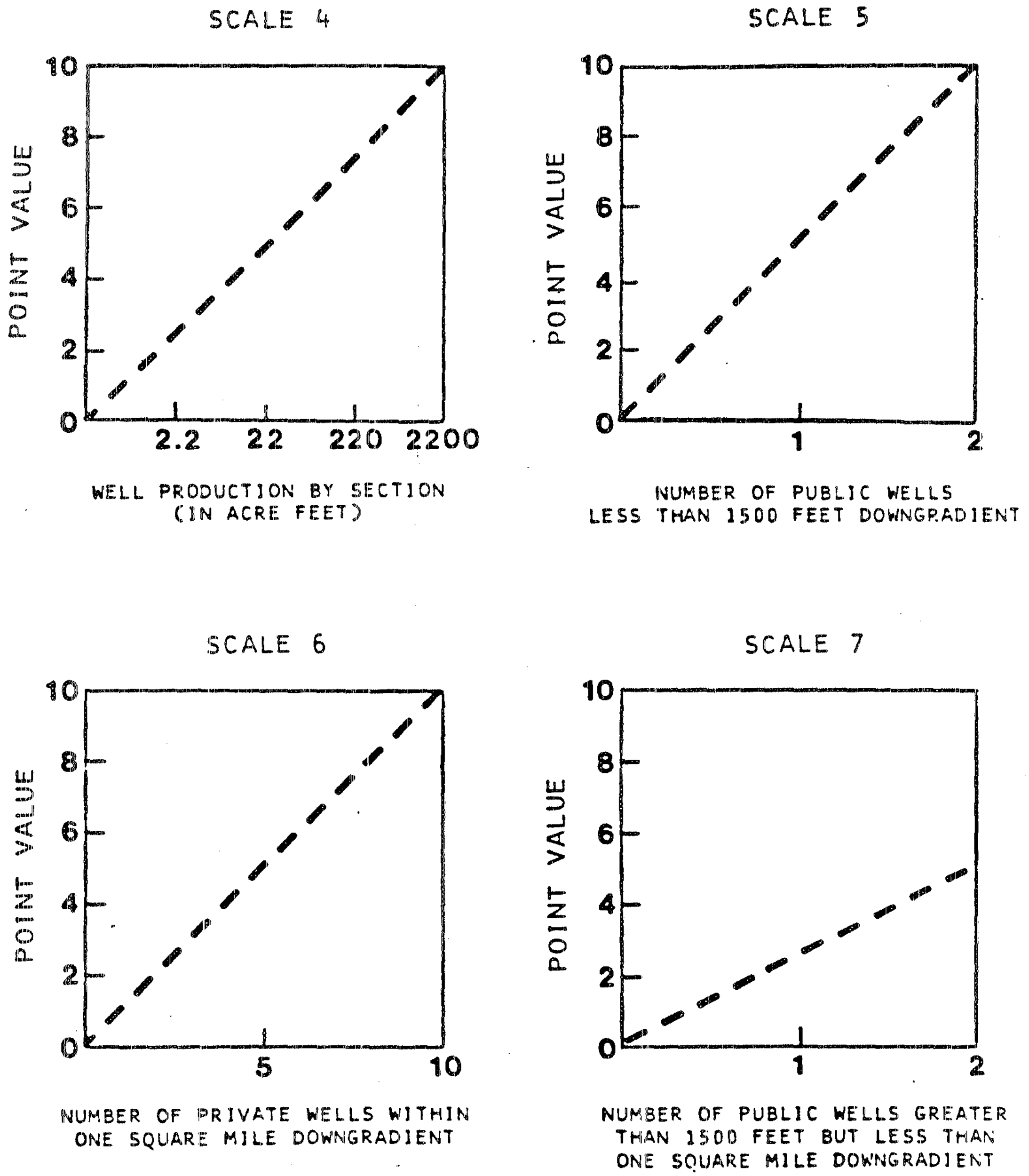


SCALE 3

NEAREST PRIVATE WELL DOWNGRADIENT

FIGURE II-3

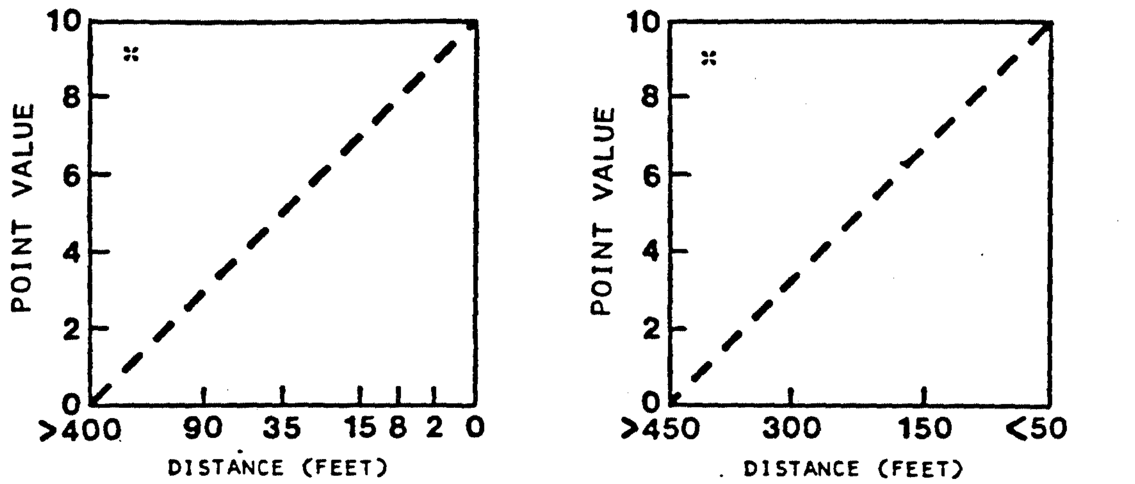
INTENSITY OF PRESENT WATER USE



NOTE: THE NUMBER OF WELLS IS IDENTIFIED BY COUNTING THE WELLS WITHIN THE SPECIFIED AREA DOWNGRADIENT. FOR EXAMPLE, IN ORDER TO IDENTIFY THE NUMBER OF PUBLIC WELLS 1500 FEET DOWNGRADIENT ALL PUBLIC WELLS WITHIN A 1500 BY 1500 FOOT AREA DOWNGRADIENT OF THE SOURCE ARE COUNTED.

FIGURE II-4

DEPTH TO GROUNDWATER



SCALE 8

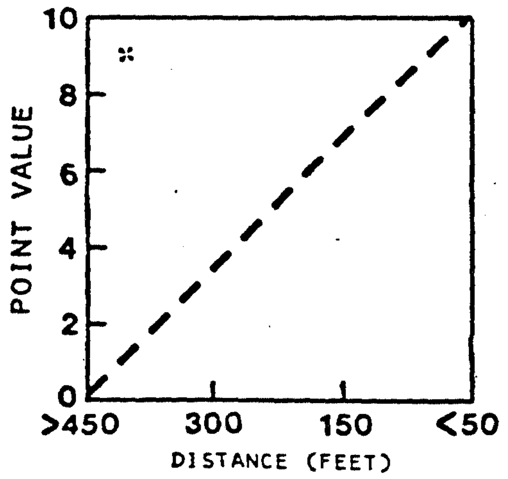
SHALLOW GROUNDWATER

SCALE 9

SHALLOWEST CURRENTLY-USED GROUNDWATER

SCALE 10

SHALLOWEST USEABLE GROUNDWATER



NOTE: DISTANCE TO GROUNDWATER IS MEASURED FROM THE DEEPEST POINT AT WHICH SOIL CONTAMINATION WAS FOUND.

mile; and scales for rating the number of public wells within 1500 ft. downgradient and outside 1500 ft. but within one square mile downgradient. Equivalent scales are also proposed for private wells. Density of wells is significant as an indicator of susceptible points of use and also because the wells represent potential connections between aquifers.

Depth to Water Tables (Barriers to Migration)

The same factors which attenuate contamination with distance also cause attenuation with depth. The depth and nature of the soils between the source at the surface and the groundwater of concern will influence the vulnerability of the groundwater. Scales have been developed, as shown in Figure II-4, to assign scores to the depth at which the shallowest groundwater, the shallowest usable groundwater, and the shallowest currently-used potable water are encountered.

Three scales, as shown in Figure II-5, have been developed to rate the saturated permeability of the soils, based on water, in several zones below the site. These provide a rough indication of the relative barrier represented by the subsurface materials in a given zone beneath the site. The measure used to make this relative comparison is the theoretical travel time for water, which is calculated by dividing the thickness of the zone by the permeability of the geologic materials in that zone. Table II-3 provides typical saturated permeability values for various classes of soil material.

TABLE II-3

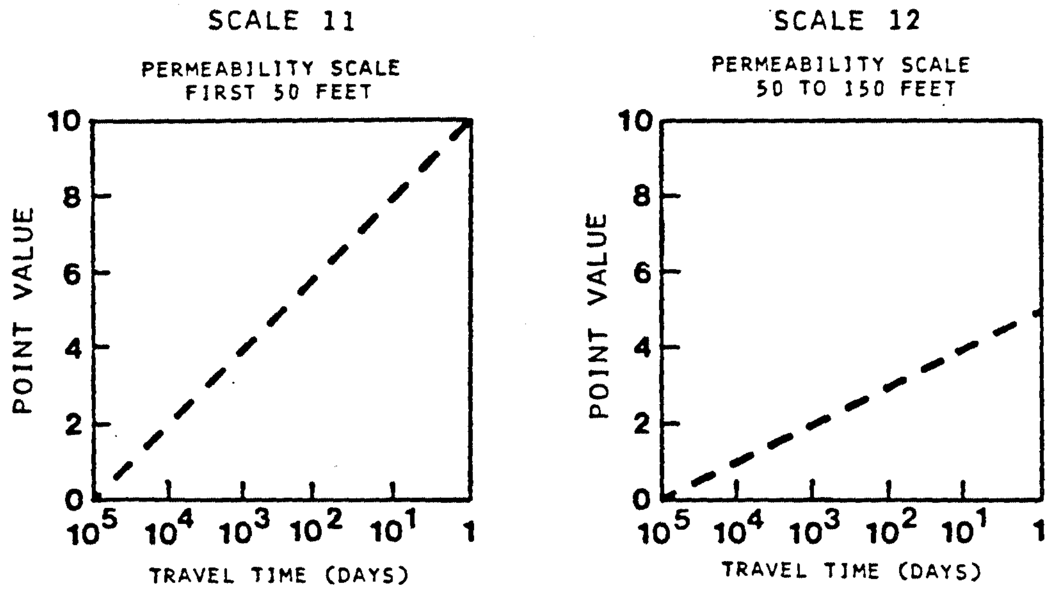
TYPICAL PERMEABILITY VALUES FOR VARIOUS

CLASSES OF SOIL MATERIAL (6)

Coefficient of Permeability (Ft.3/Ft.2/day or Ft./day)	Representative Material
$10^{4}-10^{3}$	Clean gravel
$10^{3}-10^{1}$	Clean sand and gravel
$10^{1}-10^{-1}$	Fine Sand
$10^{-1}-10^{-2}$	Sandy silt
$10^{-2}-10^{-4}$	Silt, clay mixtures
10^{-4} $<10^{-6}$	Massive clay

FIGURE II-5

PERMEABILITY OF SOILS

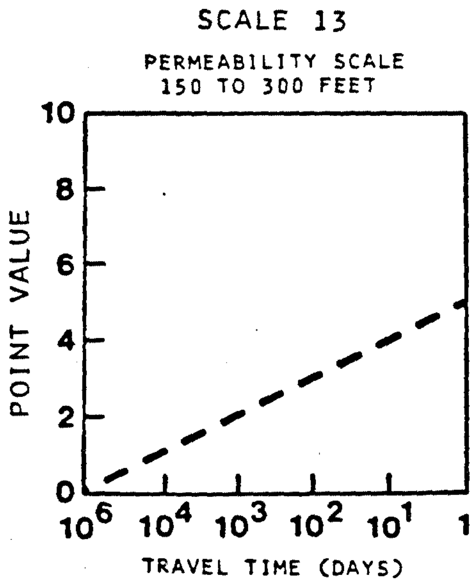


SCALE 11

PERMEABILITY SCALE
FIRST 50 FEET

SCALE 12

PERMEABILITY SCALE
50 TO 150 FEET



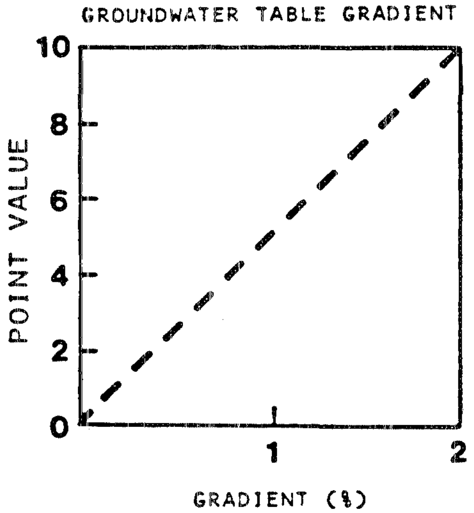
SCALE 13

PERMEABILITY SCALE
150 TO 300 FEET

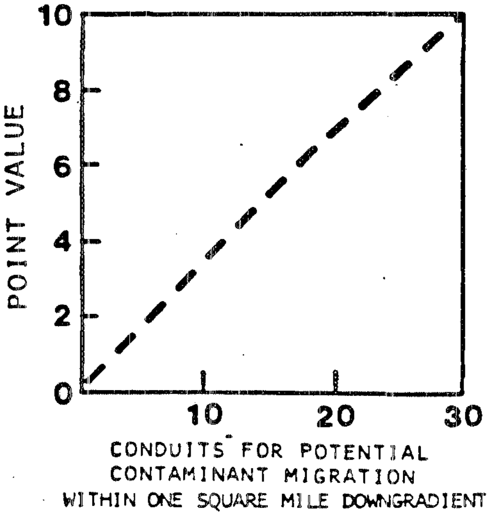
FIGURE II-6

GROUNDWATER GRADIENT AND CONDUIT SCALES

SCALE 14



SCALE 14A



An additional factor which affects the barrier represented by subsurface materials is the number and location of active, inactive, and destroyed wells within a groundwater basin. This scale, as shown in Figure II-6, is used as a measure of possible contaminant transport due to the interconnection between different water-bearing zones.

Gradient of Shallow Water Table

The rate of flow of the groundwater gradient relative to points of existing or likely future water use will influence the degree of risk at a given site. Basically, as shown in Figure II-6, a high point value is assigned for a steep gradient and zero or a point value of one is assigned to a gradient that is almost flat.

CONTAMINATION SEVERITY

A number of scales, as shown in Table II-4, were developed to address characteristics of the discharge itself. These scales reflect the potential of a release to impact the groundwater resource. These scales describe the toxicity of the contaminant(s), some important physical-chemical properties, and the relative magnitude of the release. The specific factors which were included in each group are described below and are presented in Table II-5 and Figures II-7 and II-8.

Toxicity

The toxicity of the chemical contaminants is obviously important in any assessment of the relative risk associated with a hazardous waste site. Measurement of acute toxicity is relatively straightforward, although there is some lack of standardization in test procedures. The ranking of chronic toxicity is a controversial subject. To score toxicity, three scales, as shown in Table II-5, have been directly adopted from the work of the Michigan Department of Natural Resources. (4) The first scale covers acute toxicity. It follows generally accepted terminology. Data for each route of exposure are scored independently, and the highest score is used in the ranking process. The second scale covers carcinogenicity, ranking chemicals on the basis of generally accepted classsifications. The last toxicity scale reflects mutagenic potential of a chemical based on bioassy results.

Physical-Chemical Properties

A number of properties can be used to assess the environmental behavior of contaminants. These properties include the octanol/water partition coefficient (representing bioaccumulation Kow), solubility, and soil sorption constant (Ksc), among others which were considered less important in this particular context. Shown in Figure II-7 are two scales developed for ranking soil sorption tendencies and

TABLE II-4

CONTAMINANT SEVERITY SCALE FACTORS

- TOXICITY (3 Scales)
  - Acute
  - Chronic
  - Mutagenic
- PHYSICAL-CHEMICAL PROPERTIES (2 Scales)
  - Soil Sorption
  - Bioaccumulation
- MAGNITUDE OF CONTAMINATION (4 Scales)
  - Contaminant Concentration in Soil and Groundwater
  - Contaminant Plume Dimension
  - Number of Chemicals

TABLE II-5

TOXICITY SCALES

Scale 15 Acute Toxicity

Score	Category Oral LD50 mg/kg	 Dermal LD50 mg/kg	 Aquatic LC50 mg/l
10	5	5	1
5	5-50	5-200	1-10
3	50-500	200-500	10-100
1	500-5000	500-5000	100-1000
0	5000	5000	1000
0-10	Insufficient Information		

Scale 16 Carcinogenicity

Score	Category
10	Human positive; Human suspect; Animal positive
5	Animal suspect
0	Not a known carcinogen
0-10	Insufficient Information

Scale 17 Mutagenicity

Score	Category
10	Positive in multicellular organisms and microorganisms
6	Positive in multicellular organisms
3	Positive in microorganism
0	Not a known mutagen
0-10	Insufficient Information

LD50 = Dose of chemical needed to produce death in 50% of the exposed population (humans, animals).

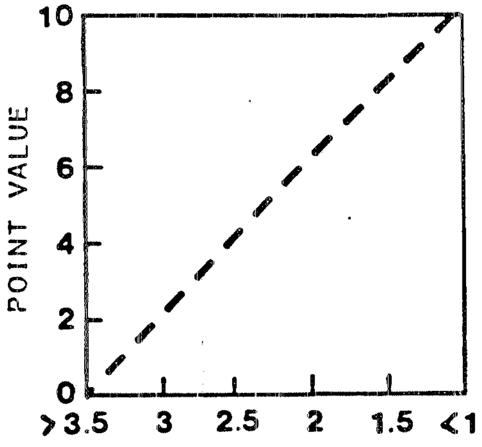
LC50 = Dose of chemical (i.e., concentration) in water needed to produce death in 50% of the exposed aquatic organisms.

FIGURE II-7

PHYSICAL/CHEMICAL PROPERTIES OF CONTAMINANTS

SCALE 18

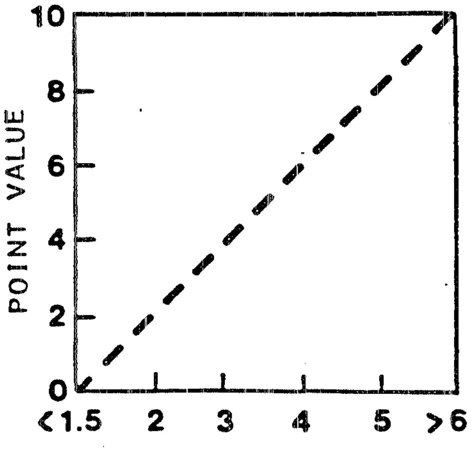
SOIL SORPTION



LOG K_{SC}
(SOIL SORPTION CONSTANT)

SCALE 19

BIOACCUMULATION

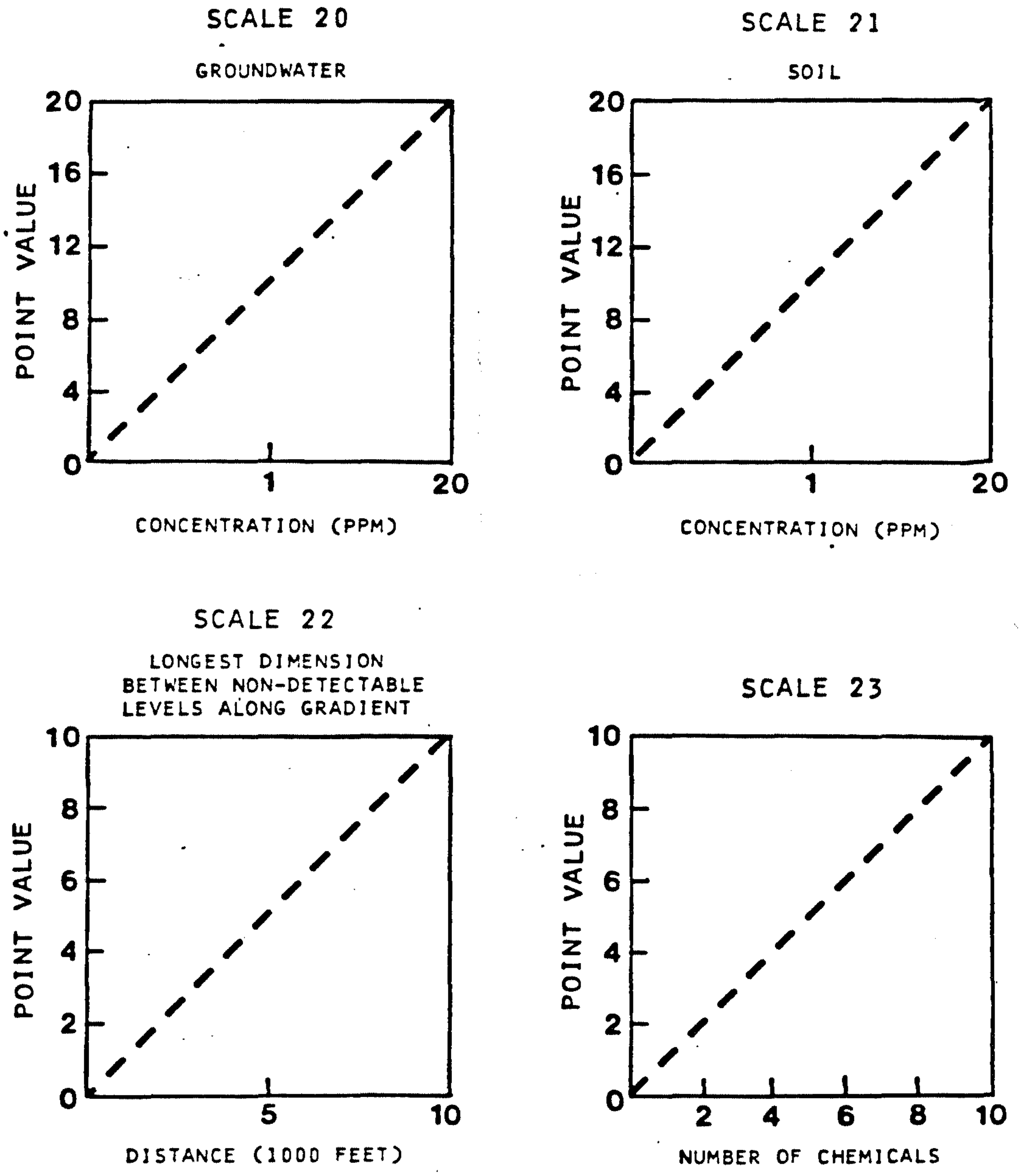


LOG K_{OW}
(OCTANOL/WATER PARTITION COEFFICIENT)

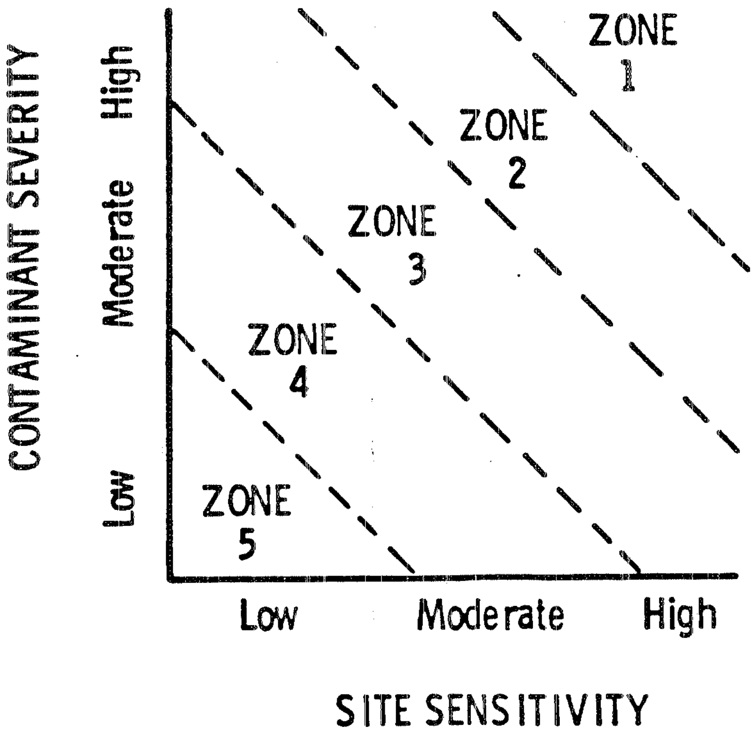
FIGURE II-8

MAGNITUDE OF CONTAMINATION

HIGHEST CONCENTRATION MEASURED



NOTE: WHEN MORE THAN ONE CONTAMINANT IS FOUND USE THE ENTIRE RATING BASED ON THE ONE WHICH GIVES THE HIGHEST SCORE.



RISK POTENTIAL MATRIX

FIGURE II-9

ZONE 1 = HIGH RISK
ZONE 5 = LOW RISK

bioaccumulation on the basis of Log Ksc and Log Kow, respectively. The values on these scales were obtained directly from the literature by replacing descriptive ratings (low to high) which appear in the work of Swann et al.(5) (for soil sorption) and Michigan Department of Natural Resources (4) (for bioaccumulation), with numerical ratings (0 to 10).

Magnitude of Contamination

While the magnitude of the contamination is extremely significant in the estimation of risk, the absolute quantity of contaminant(s) released is difficult to estimate reliably. Even an approximate estimation is rarely, if ever available until well into the investigation of a site. Therefore, four scales, as shown in Figure II-8, were developed which use indicators of contamination magnitude (concentration of contaminant, number of contaminants, and plume size) in order to develop a comparison of one site relative to another.

RANKING PROCEDURE

To develop a ranking score for a contamination site, it is necessary to assign a score or range for each of the scales shown in Figures II-2 through II-8 and Table II-5. These are subtotaled to obtain a site sensitivity rating and a contamination severity rating. This procedure is shown in Table II-6. At this point, two alternatives are available to summarize the data: 1) The two values can be added to obtain the contamination potential score, which is a combined score for numerical ranking, or 2) the two values can be plotted as shown in Figure II-9 to obtain a graphical representation. The graphical form can be used to present and interpret the scores for a large number of sites while retaining information on site sensitivity and severity.

In assigning values to individual scales, two conventions must be observed to obtain meaningful results. The first of these relates to scales which measure potential for an occurrence which has already become reality. For example, the depth and permeability of soil above shallow groundwater, or above a public water supply aquifer, are not meaningful scales after the groundwater in question has been contaminated. In such situations, the maximum value should be assigned for that particular scale. Scales which are subject to this type of scoring are marked with an asterisk "*" (left-hand corner).

The second convention concerns incorporation of uncertainty into the scoring process. Where detailed information exists regarding a particular scale it will be possible to assign a discrete value and a corresponding score to that scale for that particular case. Where there is significant uncertainty it will be necessary to assign a range of values and scores reflecting the range that appears likely to contain the correct value, estimated on the basis of whatever information is available.

TABLE II-6

INTEGRATED CONTAMINATION POTENTIAL

SITE SENSITIVITY				CONTAMINANT SEVERITY			
Scale	Data	Score	Uncertainty	Scale	Data	Score	Uncertainty
1	5000'	2	—	15	50-500	3	—
2	2000'	4	—	16	?	0-10	0-10
3	?	0-10	0-10	17	?	0-10	0-10
4	?	0-10	0-10	18	2.5	4	—
5	0	0	—	19	2.6	3	—
6	?	0-10	0-10	20	0	0	—
7	2	5	—	21	130	20	—
8	150'	1.5	—	22	0	0	—
9	150'	7	—	23	1	1	—
10	150'	7	—				
11	80 days	6	—				
12	100 days	3	—				
13	100 days	3	—				
14	1%	5	—				
14A	10	2	—				
TOTAL	—	45.5	+30	—	—	31	+ 20

Range = 45.5 to 75.5

Range = 31 to 51

TOTAL SCORE = 76.5 to 126.5

Where no information has been developed, the entire scale range should be used, reflecting the maximum range of uncertainty for that scale. The total score for a site will generally be a range, rather than a discrete number. This range reflects the sum of uncertainties encountered in scoring each of the individual factors included in the ranking procedure.

Alternative #1: Numerical Ranking

As previously noted, this alternative involves adding the site sensitivity value and contaminant severity value to obtain a numerical rating for a particular site or cluster of sites. An example of this approach is shown in Table II-7. The information used to generate this table is based on actual cases presently under investigation by the Regional Board.

The final numerical ratings and relative rankings for these investigations are shown in Table II-8. The results of this rank-ordering may be used to assist in setting priorities for remedial action.

Alternative #2: Graphical Representation

This alternative, as previously shown in Figure II-9, allows for an investigation of the interaction of the site sensitivity and contaminant severity values as well as the determination of the contamination potential associated with the site. As shown in Figure II-9, the Risk Matrix can be divided into a number of zones. In the example shown, the matrix has been divided into five zones.

Plotting the site sensitivity and contaminant severity values shown in Table II-7 results in the graphical representation shown in Figure II-10. As shown, the highest degree of risk results from a large spill of toxic chemicals in a permeable aquifer that is supplying drinking water (zone 1). In contrast, the lowest degree of risk would result from a small spill of toxic chemicals where thick clays and no aquifer occurs (zone 3). As shown in Figure II-10, the level of uncertainty associated with the data is depicted by plotting a line representing either a range in site sensitivity or contaminant severity values.

Use of the risk matrix provides a useful framework for allowing several sites to be graphically compared. A site position in the matrix indicates the degree of contamination potential, which in turn reflects the immediate need to clean-up the contamination. The results then can be used to assist in setting priorities for action regarding clean-up.

Additionally, in instances where a site might overlap a number of squares due to a high degree of uncertainty, knowledge of the specific factors responsible for the uncertainty can be further investigated and the uncertainty hopefully reduced.

TABLE II-7

EXAMPLE OF NUMERICAL RATING

Site Sensitivity Scales	Sites 1	2	3	4
Dist. to Public Well D.G.	2	8	0	0-10
Dist. to Public Well Not D.G.	4	1	1.9	1
Dist. to Priv. Well D.G.	0-10	0-10	0-10	0-10
Well Production	0-10	3	0-10	0-10
No. of Public Wells <1500'	0	5	0	0
No. of Priv. Wells <1sq.mi.	0-10	2.5	0	0-5
No. of Public wells >1500' < 1 sq. mile	5	0	0	0
Depth to Shallow G.W.	1.5	4.8	7	7
Depth to Currently Used G.W.	7	9	7	1
Depth to Potential G.W.	7	9	9	1
Conduits for Potential Contaminant Migration	2	0	0	0
Travel Time				
First 50 feet	6	5	1.8	1.8
50 to 150 feet	3	4.5	.6	.6
150 to 300 feet	3	4.2	4.2	.6
Gradient	10	5.5-10	5.5-10	5.5-10
Sub-total	45.5-75.5	63.2-72.7	37.5-62	28.5-68

TABLE II-7 (Continued)

Contamination Severity Scales	Sites 1	 2	 3	 4
Acute toxicity	3	3	5	3
Carcinogenicity	0-10	5	10	5
Mutagenicity	0-10	0-10	0-10	0-10
Soil Sorption	4	4	1	4
Bioaccumulation	3	3	3	3
Highest G.W. Conc.	0	0-20	20	20
Highest Soil Conc.	20	20	20	20
Longest Dimension	0	10	6.2	0-10
No. of Chemicals	1	10	10	10
Sub-total	31-51	55-85	75.2-85.2	65-85
Total Score	76.5-126.5	118.2-157.7	112.7-160.9	93.5-153

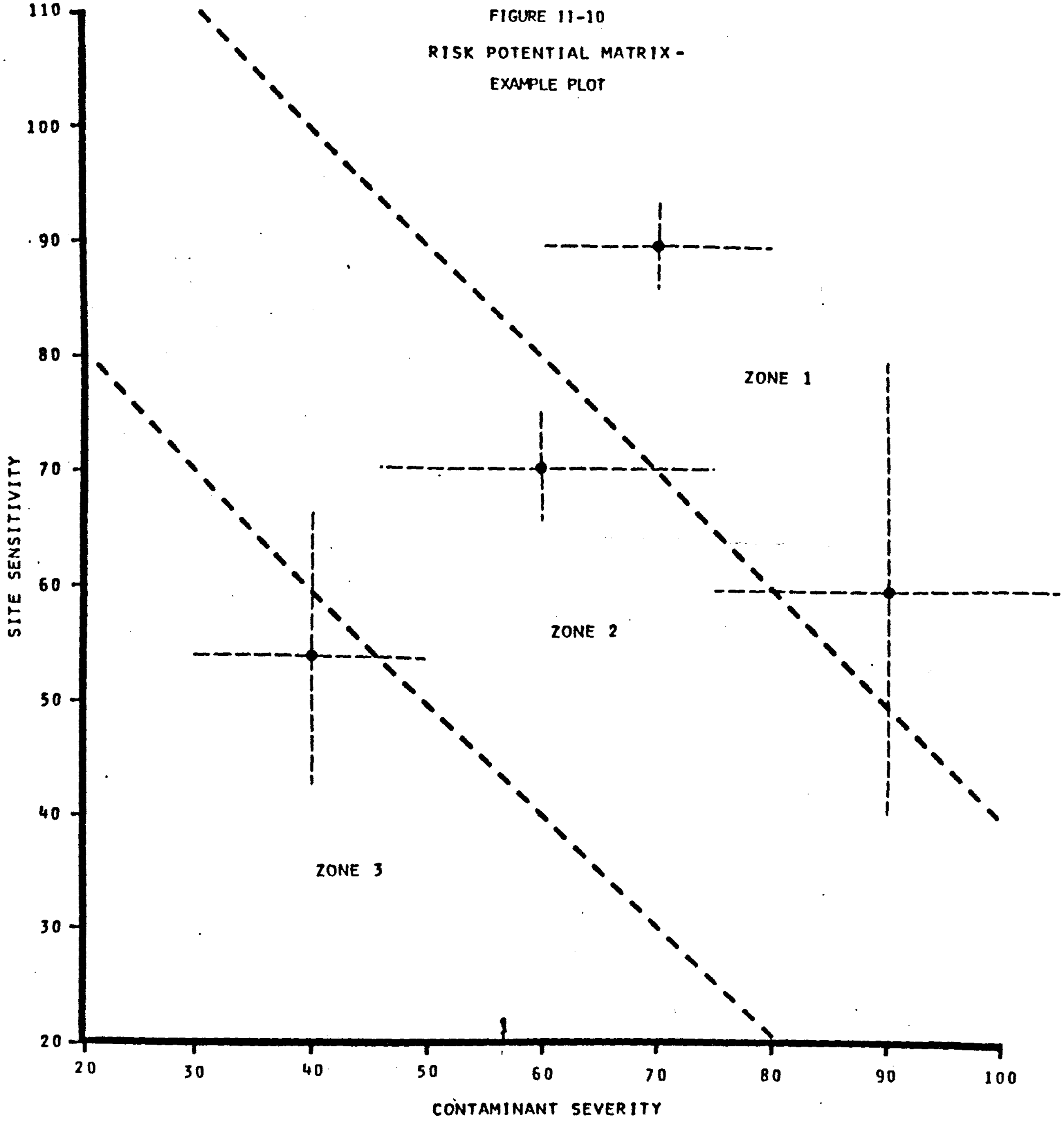
TABLE II-8

EXAMPLE OF SITE RANKING

Site	Maximum score	Rank
3	160.9	1
2	157.7	2
4	153	3
1	126.5	4

FIGURE II-10

RISK POTENTIAL MATRIX - EXAMPLE PLOT



It must be emphasized that use of this system is intended as only a standardized methodology for recording hydrogeologic factors and chemical contamination factors. The method provides a first round approximation of the degree of contamination potential for a site or group of sites relative to other sites.

METHODOLOGY SHORTCOMINGS

The assessment methodology described here has a number of potential shortcomings that should be discussed but do not necessarily need to be resolved in order to utilize the methodology. In cases where these issues could easily be resolved they have been, but others were beyond the scope of the methodology. What follows is a brief discussion of the more important issues.

Our basic goal is to design a ranking system that reflects real situations. In so doing, we have attempted to design a simple system that combines the sensitivity of a site to contamination with the contamination severity of the chemicals at the site. A more complex ranking system might better represent the real situation, however, such a system requires extensive data and thus limited in its usefulness.

The second issue relates to the toxicity scales. They rely heavily on measures of acute (short-term) toxicity and carcinogenicity (long-term). These two important criteria do not account for other chronic effects (long-term) such as reproductive impairment, physiological dysfunction or damage of organs (1). Criteria for evaluating these effects are just under development and could be included into the approach when available.

A third issue arises because the rating of contaminant severity is based on the most hazardous substance found at a site and not a composite of all chemicals found. In general, most numerical rating systems do not consider synergistic or antagonistic effects, or degradation products because of the obvious difficulties involved. However, a scale which takes into account the number of chemicals found at a site is included. We recognize that this does not address the specific issue but it gives weight to the number of chemicals involved where in other approaches this issue has generally been ignored.

A fourth issue is that the level of error or variability associated with the analytical techniques can lead to uncertainties in the numerical rating procedure. However, this is not unique to this assessment procedure and requires the setting of clearly defined levels of sensitivity and confidence in the analytical techniques. This issue has generally been dealt with by the Regional Board requiring the use of Standard Methods for the identification of contaminants as well as requiring analysis to the level of detection, generally < 1 ppb .

The final issue is the difficulty associated with data availability. Again this problem is not unique to this assessment procedure. However, as previously discussed, this limitation is dealt with by using appropriate ranges of values where uncertainty exists.

In general, the above issues all have some impact on the assessment procedure. However, we believe the most significant ones have been adequately covered within the assessment procedure thereby minimizing any unexpected impacts.

REFERENCES

1) Office of Technology Assessment, "Technologies and Management Strategies for Hazardous Waste Control", Washington, D.C., 1983, pp. 1-407.

2) LaGrand, H.E., "A Standardized System for Evaluating Waste-Disposal Sites", National Water Well Assoc., Ohio, 1980, pp. 1-39.

3) Young, J.T., and W.E. Bye, "Methods of Preventing, Detecting and Dealing With Surface Spills of Contaminants Which May Degrade Underground Water Sources for Public Water Systems", EPA-570/9-79-018, U.S.E.P.A., Washington, D.C., 1979, pp. 1-112.

4) Michigan Department of Natural Resources, "Michigan Critical Materials Register", Lansing, Michigan, 1980, pp. 1-67.

5) Swann, R.L., et. al., "A Rapid Method for the Estimation of the Environmental Parameters Octanol/Water Partition Coefficient, Soil Sorption Constant, Water to Air Ratio, and Water Solubility", *Residue Reviews*, Vol. 85, 1983, pp. 17-28.

6) Todd, D. K., *Ground Water Hydrology*, John Wiley & Sons, Inc., 1960.

III. STUDY AREA DESCRIPTION

The Santa Clara Valley, as shown in Figure III-1, is located in Santa Clara County immediately south of San Francisco Bay. The three major groundwater subbasins in this area are shown in Figure III-2. They are the Santa Clara Valley, Coyote, and Llagas subbasins. These basins are interconnected and occupy approximately 240,000 acres or approximately 30 percent of the total County land area. As noted earlier, the assessment methodology will be applied to sites with solvent contamination that are located within the Santa Clara Valley and Coyote Valley groundwater basin. The study area boundary is shown in Figure III-3. Also a list of the references used to prepare this section can be found at the end of this section.

The intent of this section is to provide a brief overview of water supply sources within the County and of basin hydrogeology for the Santa Clara Valley and Coyote subbasins. In addition, basic information on the groundwater resource which is necessary in order to utilize the assessment methodology will also be presented.

Within this report, information is only presented on the Santa Clara Valley and Coyote subbasins. This is because the Regional Board's boundary includes the Santa Clara Valley subbasin and portions of the Coyote subbasin and does not include the Llagas subbasin. As shown in Figure III-4, 13 local governments are located within the valley.

WATER SUPPLY

The water supply needs for the communities located within the study area are met from four sources: 1) natural groundwater, 2) surface water, 3) the South Bay Aqueduct of the State Water Project, and 4) the Hetch Hetchy Aqueduct of the City of San Francisco. Groundwater supplies about half of the total water used in the Santa Clara Valley subbasin and essentially all of the water used in the Coyote and Llagas subbasins.

Nine public agencies and six major privately owned water companies supply water to users in the Santa Clara Valley subbasin, as shown in Figure III-5. These purveyors provide different blends of local or imported surface waters and groundwaters to their customers.

As shown in Table III-1, 258 public water supply wells are located within the Santa Clara Valley subbasin. For purposes of this study, a public water supply well was defined as a well producing $\geq$ 16.5 acre-ft per year(i.e., enough to serve greater than or equal to 75 persons at an assumed 0.22 acre-feet per person per year) and that is not used for agricultural purposes. The general charactersitics of these wells are also shown within

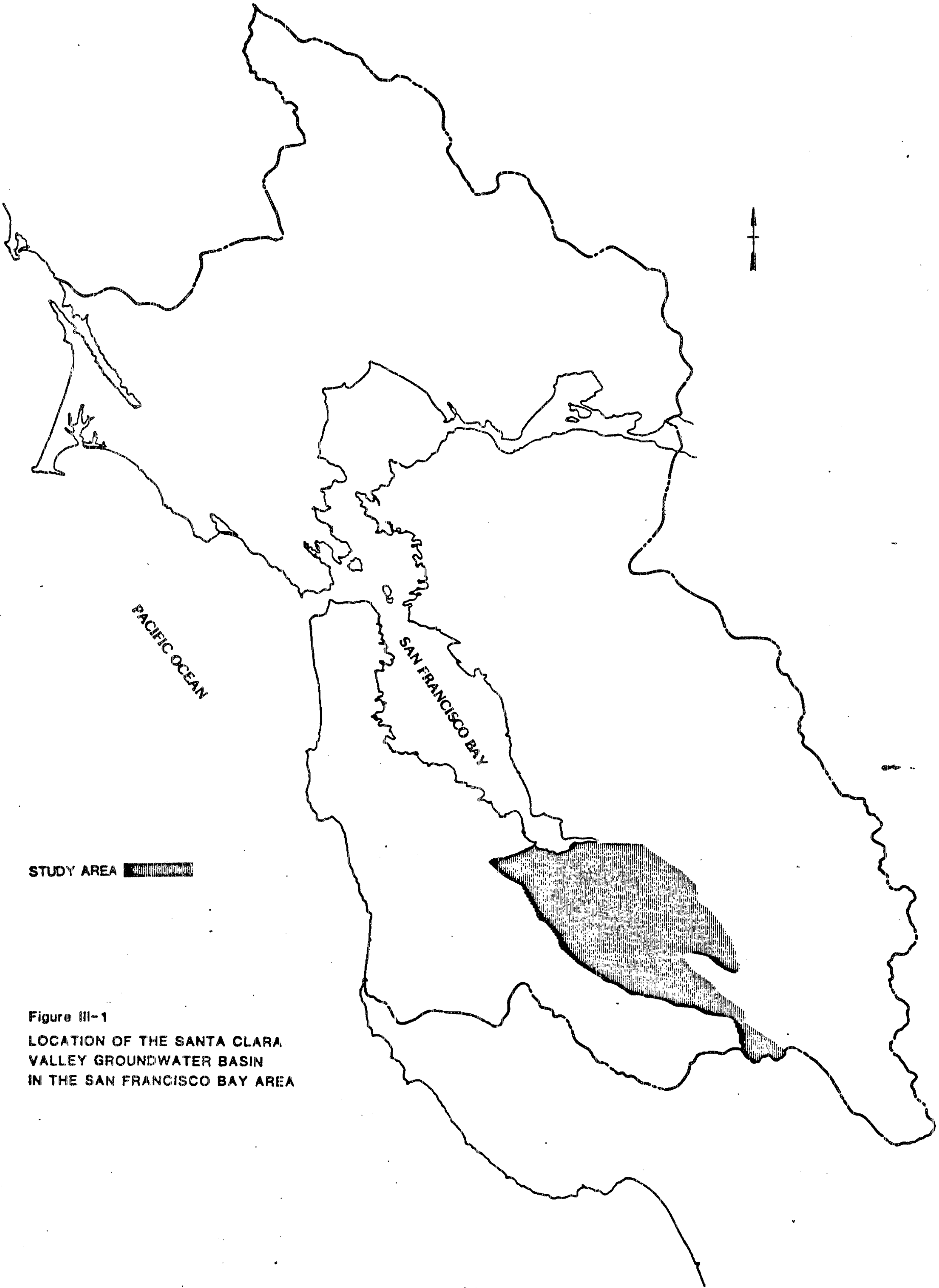


Figure III-1
LOCATION OF THE SANTA CLARA VALLEY GROUNDWATER BASIN IN THE SAN FRANCISCO BAY AREA

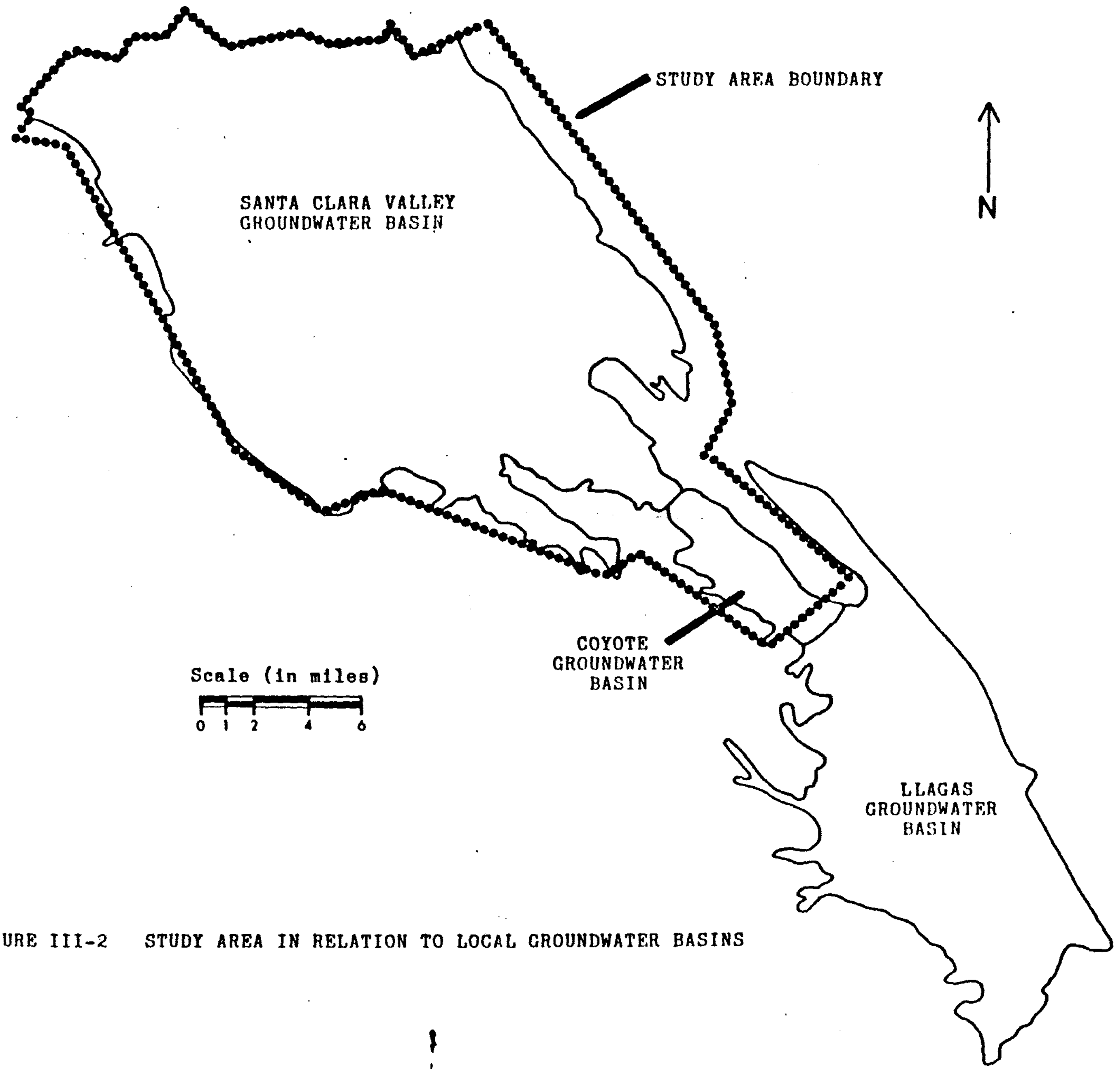
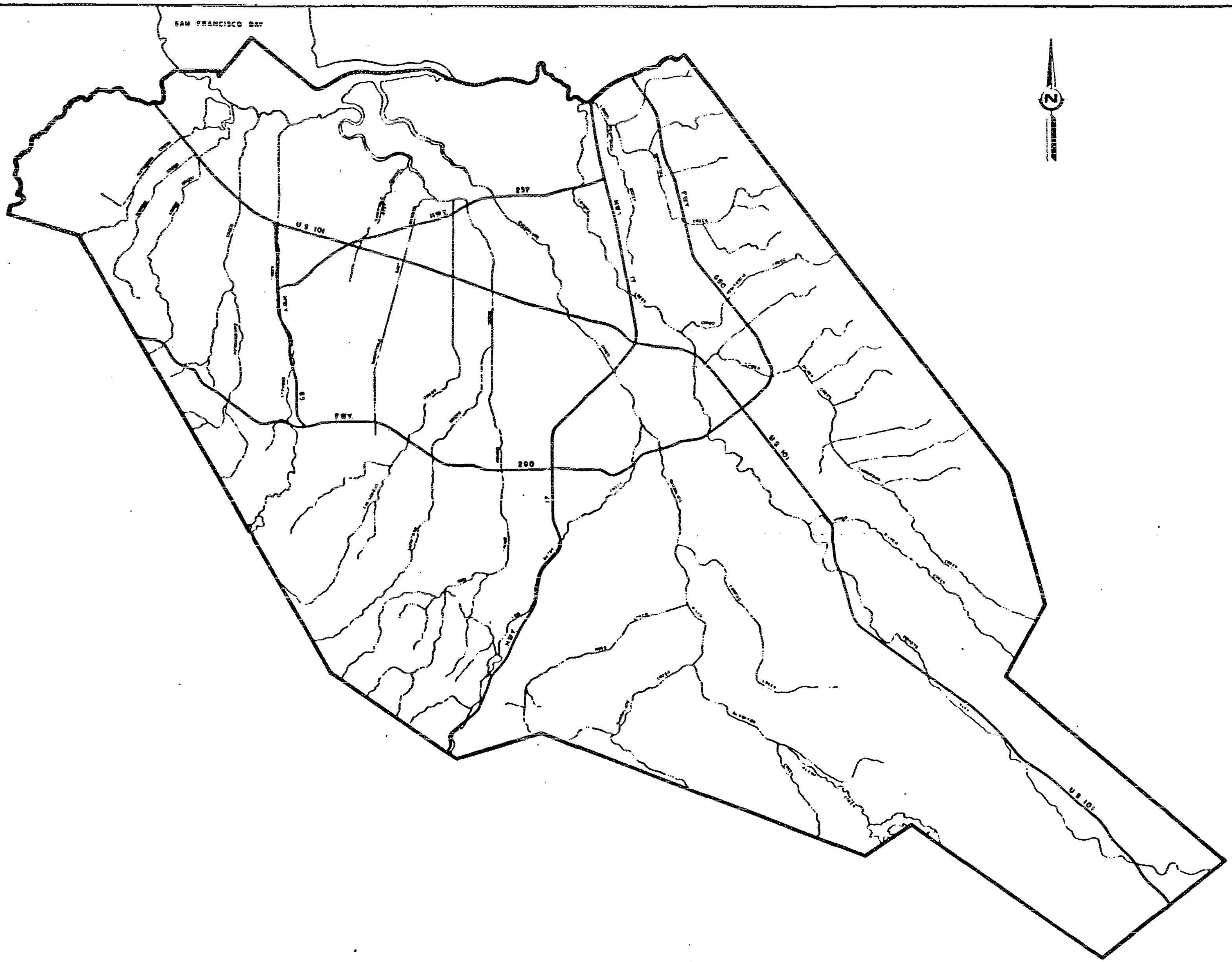


FIGURE III-2 STUDY AREA IN RELATION TO LOCAL GROUNDWATER BASINS



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
AND
SANTA CLARA VALLEY WATER DISTRICT

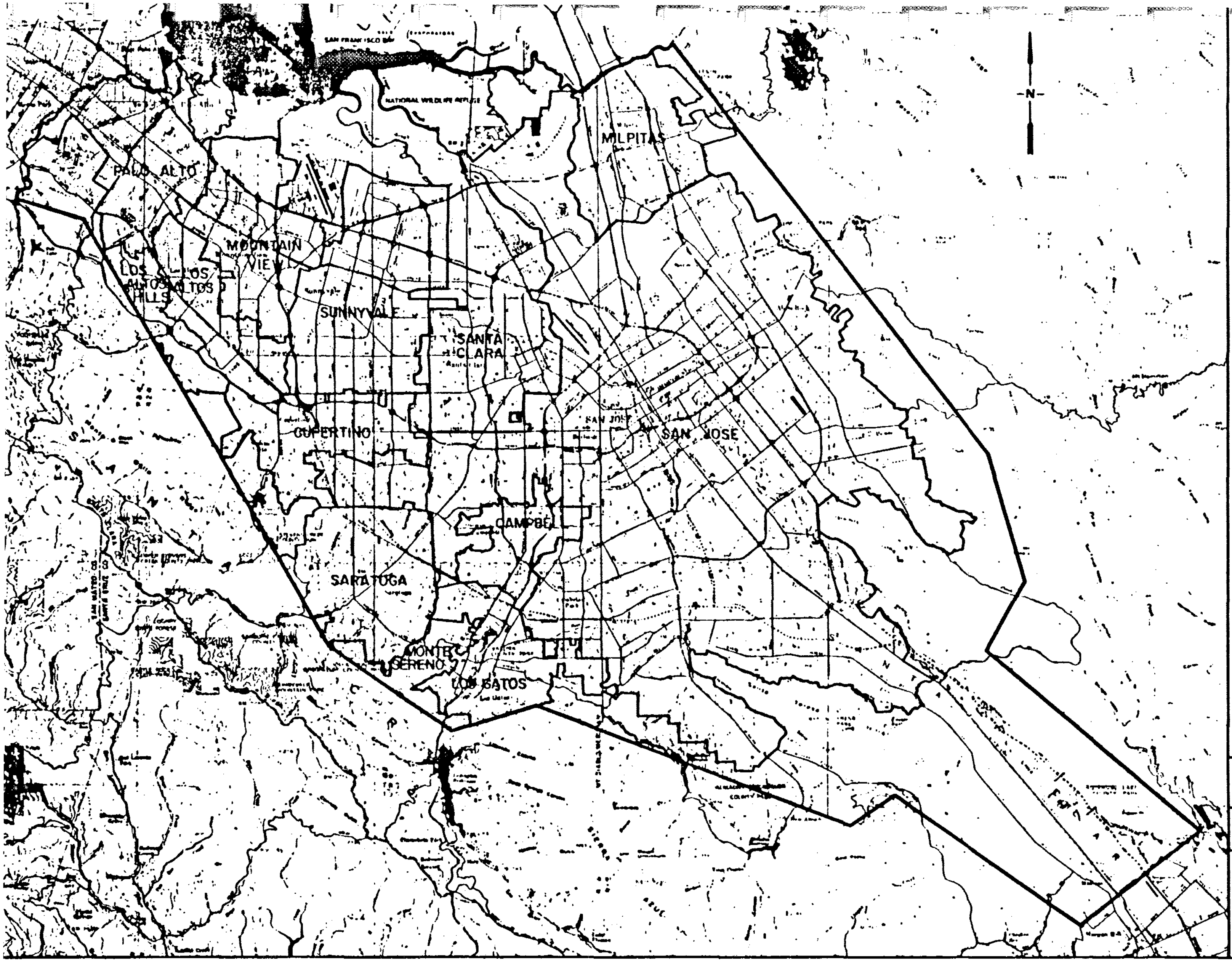
ASSESSMENT OF CONTAMINATION FROM LEAKS OF
HAZARDOUS MATERIAL IN THE SANTA CLARA VALLEY
GROUNDWATER BASIN

STUDY AREA BOUNDARY

5000 0 5000
SCALE IN FEET

DECEMBER 1984

FIGURE III- 3



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
AND
SANTA CLARA VALLEY WATER DISTRICT

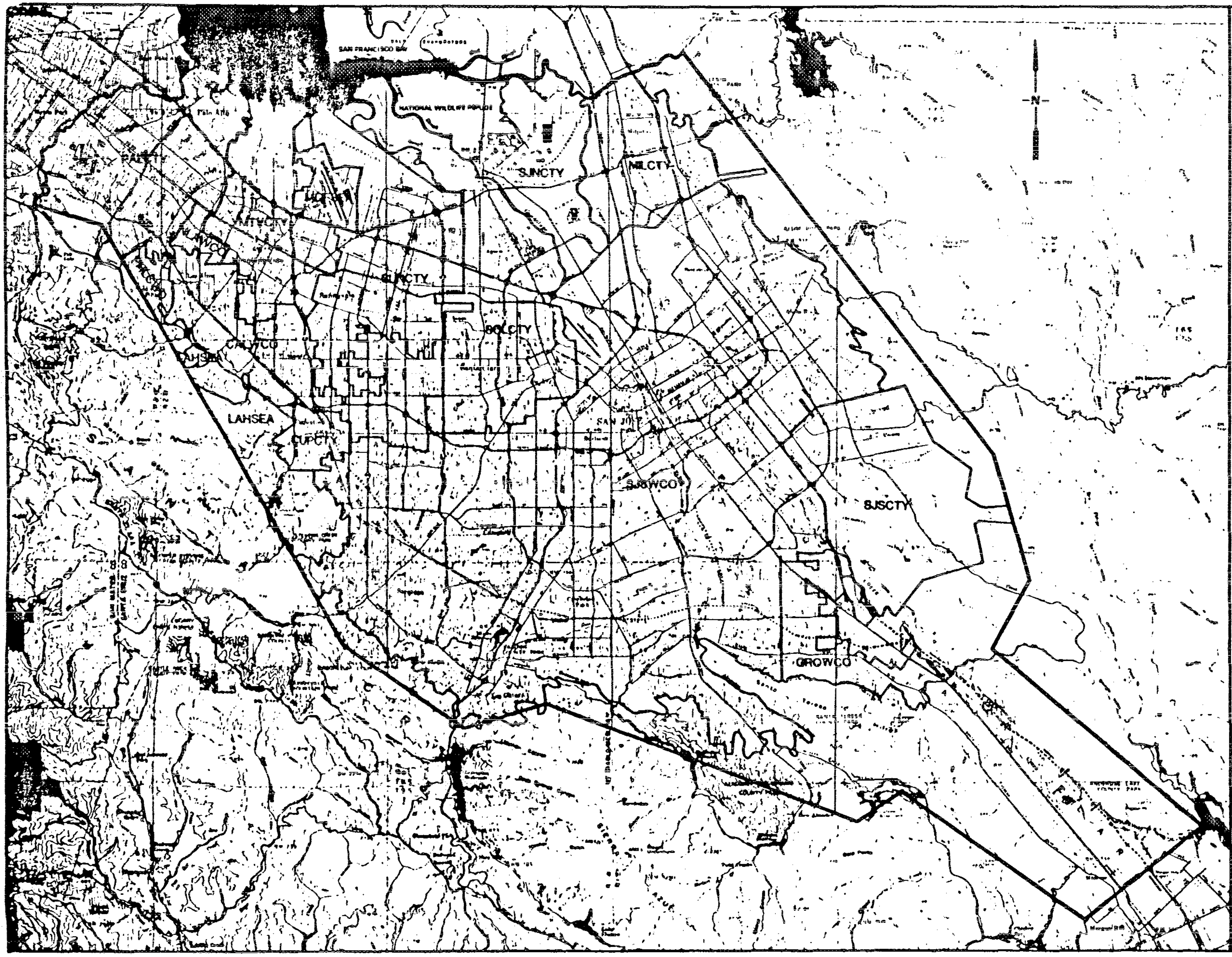
ASSESSMENT OF CONTAMINATION FROM LEAKS OF
HAZARDOUS MATERIAL IN THE SANTA CLARA VALLEY
GROUNDWATER BASIN

LOCAL ENTITY JURISDICTIONS

SCALE IN FEET

DECEMBER 1984

FIGURE III-4



LEGEND

CALWCO - CALIFORNIA WATER COMPANY
CUPCTY - CITY OF CUPERTINO
GROWCO - GREAT OAKS WATER COMPANY
LAHSEA - LOS ALTOS HILLS SERVICE AREA
MILCTY - CITY OF MILPITAS
MOFSEA - MOFFETT FIELD SERVICE AREA
MTVCTY - CITY OF MOUNTAIN VIEW
NLAWCO - NORTH LOS ALTOS HILLS WATER COMPANY
PALCTY - CITY OF PALO ALTO
PHLCWD - PURISSIMA HILLS COUNTY WATER DISTRICT
SCLCTY - CITY OF SANTA CLARA
SJNCTY - CITY OF SAN JOSE, NORTHERN SECTION
SJSCTY - CITY OF SAN JOSE, SOUTHERN SECTION
SJSWCO - SAN JOSE WATER COMPANY
SUNCTY - CITY OF SUNNYVALE

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
AND
SANTA CLARA VALLEY WATER DISTRICT

ASSESSMENT OF CONTAMINATION FROM LEAKS OF
HAZARDOUS MATERIAL IN THE SANTA CLARA VALLEY
GROUNDWATER BASIN

WATER PURVEYORS

5000 0 5000
SCALE IN FEET

DECEMBER 1984

FIGURE III- 5

TABLE III-1

PUBLIC WATER SUPPLY WELLS

GROUNDWATER PRODUCTION 1982-83

Facility Number	Non-Agric. Prod Acre Feet	Well Depth (ft)	Discharge Pipe Diameter (in.)
06S1E32E04	25.18	297	4
06S1E33P01	99.97	385	4
06S1E34L02	17.69	400	4
06S1W13N03	71.17	785	6
06S1W13N04	71.18	800	10
06S1W22J01	127.42	815	8
06S1W22J02	127.42	800	8
06S1W22J03	127.41	800	8
06S1W24P02	43.94	218	3
06S1W30N01	126.19	646	7
06S1W30N03	197.23	980	-
06S1W32D02	85.28	429	5
06S1W35M02	397.00	180	8
06S2W19D12	31.78	500	5
06S2W25R10	157.19	750	7
06S2W29C01	31.65	450	6
06S2W33B01	27.02	400	6
06S3W24H11	31.18	N/A	6
07S1E05M03	219.60	N/A	8
07S1E07P02	175.03	N/A	N/A
07S1E07P03	175.04	N/A	N/A
07S1E08A01	145.32	275	3
07S1E08Q10	323.49	N/A	8
07S1E16L01	58.44	N/A	8
07S1E18K01	239.49	820	10
07S1E20B03	103.01	469	10
07S1E20B04	103.01	537	10
07S1E20G02	103.01	500	10
07S1E20G03	102.99	560	10
07S1E21C01	296.54	500	8
07S1E21C02	296.54	500	8
07S1E22B03	63.50	490	6
07S1E22M01	109.07	508	6
07S1E26E01	33.87	300	4
07S1E26R02	37.57	400	N/A
07S1E27D01	12.71	N/A	8
07S1E27D08	296.26	360	8
07S1E27G05	25.84	220	5
07S1E27H01	64.75	300	4
07S1E32J04	219.29	N/A	5
07S1W02Q01	94.32	502	8
07S1W11E10	91.68	500	6
07S1W12B02	36.11	483	3
07S1W14B01	160.97	N/A	6
07S1W20B01	25.74	700	4

Facility Number	Non-Agric. Prod Acre Feet	Well Depth (ft)	Discharge Pipe Diameter (in)
07S1W23A02	183.47	528	8
07S2E28F03	92.04	N/A	4
07S2W16B10	22.38	30	3
07S2W16B11	29.20	70	3
08S1E01M10	17.66	N/A	6
08S1E01P02	58.43	N/A	5
08S1E12F10	34.39	N/A	1
08S1E12H03	94.33	N/A	6
08S1E17D01	41.64	480	2
08S1E17E02	55.75	—	–
08S1W07A01	46.41	755	3
06S2W20F04	24.55	580	4
06S2W28Z01	115.71	N/A	8
06S2W28N01	—	425	6
06S2W28N02	—	600	6
06S2W29F02	56.42	600	8
06S2W29K05	81.27	600	8
06S2W29M02	59.03	700	6
06S2W32D01	26.63	515	6
06S2W34G02	157.71	402	8
06S2W34K02	186.62	746	8
07S1W06P01	208.20	706	10
07S1W07N01	488.53	750	8
07S1W18K01	245.92	830	8
07S2W01B01	40.69	620	N/A
07S2W01E02	197.42	845	10
07S2W01E03	238.18	780	10
07S2W01H01	186.18	708	8
07S2W01L01	142.29	849	10
07S2W02G01	195.96	690	10
07S2W02K02	268.30	640	8
07S2W03A02	579.32	881	8
07S2W03C02	355.61	639	8
07S2W03D02	1009.79	640	8
07S2W03H01	69.98	786	10
07S2W13C01	370.49	716	6
07S2W12F01	107.58	950	8
08S1E01J02	727.85	300	10
08S1E12D10	329.43	274	10
08S1E12P01	349.54	366	9
08S1E13H10	976.13	N/A	9
08S2E06M10	843.69	245	12
08S2E08M07	372.86	296	N/A
08S2E17J10	1747.04	254	10
08S2E17N10	1681.43	274	10
08S2E18D10	1225.68	234	10
08S2E18E10	1596.24	230	0
08S2E18E11	566.22	220	10
08S2E18K10	1360.54	N/A	9

Facility Number	Non-Agric. Prod Acre Feet	Well Depth (ft)	Discharge Pipe Diameter (in)
06S2W17R01	623.76	122	10
06S2W21D08	436.38	565	8
06S2W22G01	911.76	817	8
06S2W33B02	33.44	545	6
06S2W33C01	40.30	1120	8
06S1W24E02	30.94	640	10
07S1E26A01	193.20	380	10
07S1E26B02	247.09	355	8
07S1E26B10	348.80	400	12
06S1E16Z02	1805.96	N/A	16.
06S1E16K03	—	N/A	10.
06S1E16K04	—	816	10.
06S1E16K05	—	816	10.
06S1E16K10	—	823	10.
06S1E30Z01	1297.47	N/A	24.
06S1E30D10	—	742	12
06S1E30D11	—	742	12
06S1E32G01	2570.11	800	12
06S1E33Z01	283.78	N/A	16
06S1E33F06	—	612	6
06S1E33F10	—	624	8
07S1E02L02	99.36	443	6
07S1E02Z01	207.08	N/A	12
07S1E02J06	—	695	12
07S1E03A01	96.23	620	10
07S1E07Z01	5594.44	N/A	20
07S1E07R02	—	788	10
07S1E07R04	—	800	10
07S1E07R05	—	831	12
07S1E07R07	—	814	10
07S1E07R08	—	788	10
07S1E07R12	—	N/A	N/A
07S1E07R13	—	N/A	N/A
07S1E07R14	—	N/A	N/A
07S1E18A01	—	800	10
07S1E09Z01	3654.24	N/A	12
07S1E09Z02	3318.41	N/A	12
07S1E09D02	—	1535	8
07S1E09D03	—	560	10
07S1E09D04	—	698	10
07S1E09D05	—	725	8
07S1E09D06	—	742	10
07S1E09D07	—	742	12
07S1E09D08	—	850	10
07S1E09D09	—	852	10
07S1E15N03	—	800	10
07S1E16Z01	54.93	N/A	12
07S1E16Z02	1953.81	N/A	12

Facility Number	Non-Agric. Prod Acre Feet	Well Depth (ft)	Discharge Pipe Diameter (in
07S1E16Z03	1043.47	N/A	12
07S1E16C02	—	800	10
07S1E16C04	—	794	8
07S1E16C05	—	725	10.
07S1E16C06	—	716	10
07S1E16C07	—	800	8
07S1E16C08	—	790	8
07S1E16C09	—	866	10
07S1E16F10	—	765	12
07S1E16G10	—	791	12
07S1E18P01	110.11	800	10
07S1E20Z01	5777.51	N/A	23
07S1E20Q01	—	390	10
07S1E20Q02	—	555	8
07S1E20Q03	—	314	10
07S1E20Q04	—	314	10
07S1E20Q05	—	328	12
07S1E21Z01	846.92	N/A	10
07S1E21Z04	2901.09	N/A	12
07S1E21E02	—	752	10
07S1E21E03	—	803	10
07S1E21E04	—	744	8
07S1E21E05	—	732	10
07S1E21E06	—	728	10
07S1E22Z01	5823.39	N/A	24
07S1E22H04	—	780	12
07S1E22H05	—	800	12
07S1E22H06	—	756	12
07S1E22H07	—	850	12
07S1E26D02	748.42	528	8
07S1E29Z01	2555.56	N/A	16
07S1E29A01	—	N/A	10
07S1E29A02	—	438	10
07S1E32J03	263.14	315	4
07S1W13Z03	2080.25	N/A	16
07S1W13Z04	115.57	N/A	12.
07S1W13J02	—	650	8
07S1W13J03	—	662	10.
07S1W13J04	—	694	8
07S1W13J05	—	690	10
07S1W13J06	—	800	12
07S1W13J07	—	801	12
07S1W13K03	—	634	12
07S1W13K04	—	550	8
07S1W13Z05	3011.50	N/A	8
07S1W13Z06	1289.17	N/A	N/A
07S1W13E01	—	618	10
07S1W13E02	—	802	10
07S1W13E03	—	796	10

Facility Number	Non-Agric. Prod Acre Feet	Well Depth (ft)	Discharge Pipe Diameter (in)
07S1W13E04	—	812	10
07S1W22Z02	3104.26	N/A	25
07S1W22Z03	5801.60	N/A	30
07S1W22E01	—	732	10
07S1W22E02	—	568	10
07S1W22E03	—	770	18
07S1W22E04	—	770	10
07S1W22E05	—	800	18
07S1W22E06	—	750	18
07S1W22E08	—	852	12
07S1W22E09	—	800	12
07S1W22E10	—	800	12
07S1W22E11	—	855	12
07S1W22E12	—	801	10
07S1W22E13	—	800	10
07S1W22E14	—	801	10
07S1W22F01	—	806	10
07S1W22F02	—	752	12
07S1W23Z01	3723.65	N/A	30
07S1W23Z02	882.04	N/A	12
07S1W23R01	—	830	10
07S1W23R02	—	835	10
07S1W23R03	—	830	12
07S1W23R04	—	832	12
07S1W23R05	—	850	12
07S1W23R07	—	846	12
07S1W24Z01	3553.48	N/A	20
07S1W24J02	—	824	10
07S1W24J03	—	834	10
07S1W24J04	—	800	16
07S1W24J05	—	795	16
07S1W26E01	291.55	536	8
08S1E04Z01	1088.70	N/A	18
08S1E04M01	—	430	10
08S1E04M02	—	425	16
08S1E04M03	—	424	16
08S1E04M04	—	432	16
08S1E05Z01	984.47	N/A	16
08S1E05H03	—	445	10
08S1E05H04	—	448	10
08S1E05H05	—	435	10
08S1E05H06	—	453	10
08S1E05H07	—	445	8
08S1E10Z01	3884.92	N/A	24
08S1E10G02	—	378	12
08S1E10G03	—	400	12
08S1E10G04	—	406	12
08S1E10G05	—	406	12
08S1E10K03	—	400	12

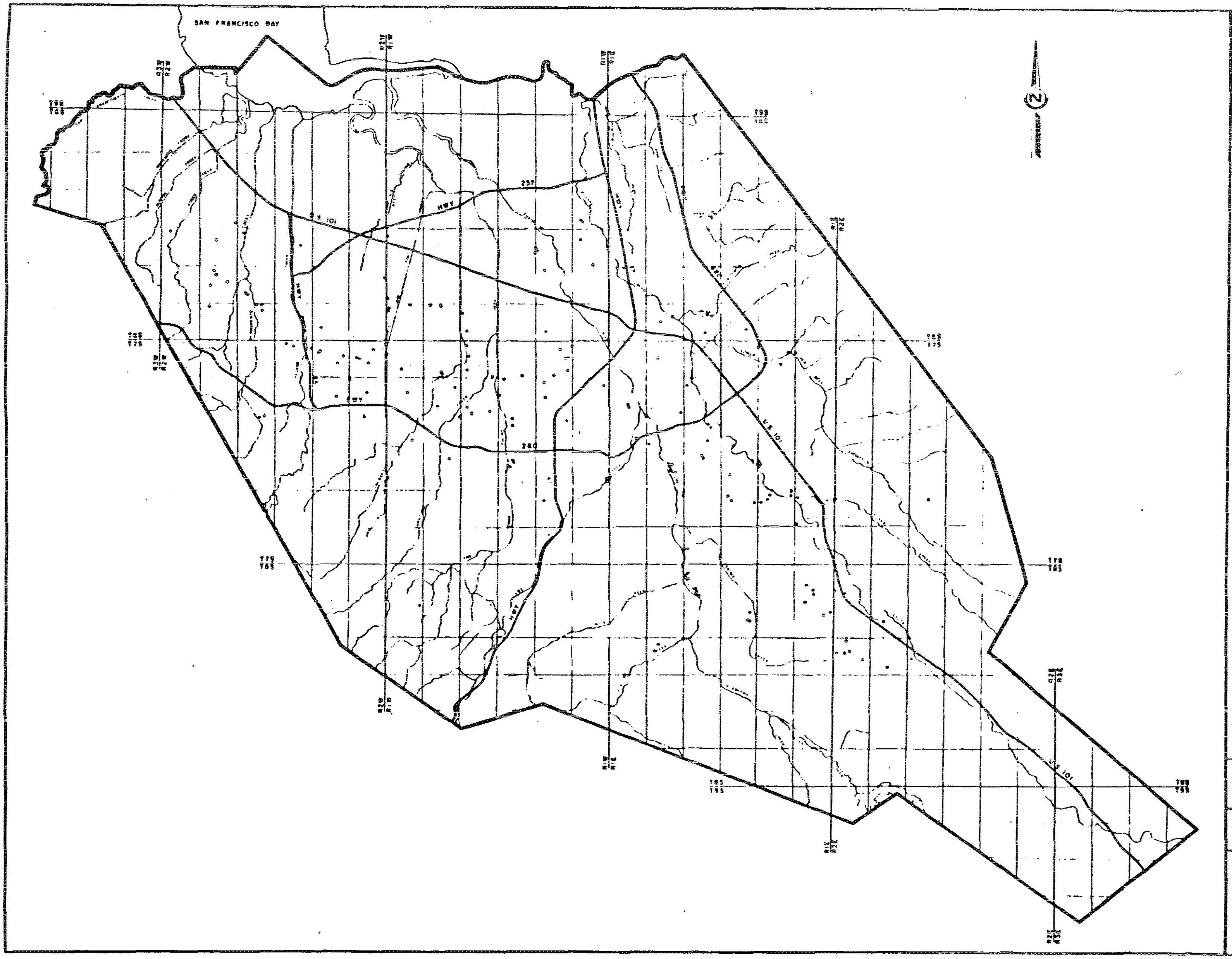
Facility Number	Non-Agric. Prod Acre Feet	Well Depth (ft)	Discharge Pipe Diameter (in)
08S1E10K04	—	226	12
06S1W26D02	306.02	N/A	8
06S1W32C11	1448.19	N/A	N/A
06S1W32H01	1438.35	655	10
06S1W33N01	1023.10	528	10
07S1W02A10	1250.70	900	10
07S1W02B01	329.85	830	N/A
07S1W02G02	412.26	864	10
07S1W02G03	472.40	797	10
07S1W02P02	495.55	N/A	N/A
07S1W03Q01	454.91	784	8
07S1W04D01	448.56	580	8
07S1W04E02	630.13	570	N/A
07S1W04N02	567.17	594	8
07S1W04Q01	619.85	500	10
07S1W05P02	1084.45	800	10
07S1W08B02	1112.46	800	10
07S1W08N01	1069.90	604	8
07S1W09J01	927.64	500	10
07S1W09N01	826.78	710	10
07S1W09N02	191.68	815	10
07S1W09Q01	977.15	530	10
07S1W10D10	950.76	832	10
07S1W11D02	975.41	550	10
07S1W15D01	793.63	660	10
07S1W15E01	1027.24	500	10
07S1W17A02	828.65	760	N/A
06S1W31B03	982.36	630	12
06S2W25H01	590.30	662	8
06S2W35M01	661.32	500	6
06S2W36Z01	170.89	N/A	10
06S2W36A01	571.21	620	8
06S2W36A02	—	620	8
07S1W07F01	400.42	594	8
07S2W02E01	822.16	700	8
07S2W02E02	834.02	560	6
07S2W11A01	811.73	610	8
07S2W11G02	463.34	507	8
06S3W03M10	53.33	305	6

this table. In general, public water supply wells draw water from the deep aquifers (i.e., greater than approximately 150 feet), but in some cases they draw from both deep and shallow aquifers. Figure III-6 graphically illustrates the location of these wells within the Santa Clara subbasin. A number of well locations, as shown in Figure III-6, are actually clusters of 2 or more wells at one location.

Aside from the public water supply wells, approximately 1,205 additional wells are used for pumping groundwater in the Santa Clara Valley sub-basin. These wells, again for the purposes of this study, have been termed private water supply wells, defined as producing < 16.5 acre-ft per year (i.e., serve less than 75 persons). It should be noted that the definition of public and private water supply wells used within this report differs from the definition of a public water supply system used by the California Department of Health Services (DOHS) to regulate water systems. DOHS regulations define a public water system as serving 5 or more connections. DOHS itself handles only those systems with 200 or more connections (i.e., approximately 500 persons assuming 2.5 persons per connection). The county health departments handle systems of 5 to 199 connections (i.e., at least 13 persons assuming 2.5 persons per connection). Review of the available well data indicated that a more sensitive cutoff for defining large public versus small public water supply wells could be identified. The available data allowed establishment of a cutoff at 75 persons. Within this report the term private well is used to describe those wells that serve less than 75 persons. In addition the listing of private wells in this report also includes wells that serve an individual connection whereas they are not covered within the State regualtions.

Data on the construction details of the private wells is lacking. Basically, the only available information from the Santa Clara Valley Water District (SCVWD) files includes pumping records used for revenue purposes by the SCVWD. The total pumping by section, excluding major public well, agricultural, and groundwater decontamination production, was taken from pumping records for the 1982-3 fiscal year and are shown in Table III-2. The staff of the SCVWD believe that many of these wells could penetrate both shallow as well as deep aquifers. These wells can act as a conduit transmitting contaminated groundwater from shallow to deeper groundwater bearing zones.

In order to illustrate the number and general location of private wells, a well density map (i.e., the number of wells per square mile) was developed and is shown in Figure III-7. As shown, the highest density of private wells appears to be in the older subdivisions of Palo Alto, and Mt. View, with pockets in the northern and downtown areas of San Jose, portions of Campbell, and in the southern area of San Jose adjacent to Alamitos Creek.



LEGEND

● WELLS

WELL FIELDS
(ACTUAL NO. SHOWN)

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
AND
SANTA CLARA VALLEY WATER DISTRICT

ASSESSMENT OF CONTAMINATION FROM LEAKS OF
HAZARDOUS MATERIAL IN THE SANTA CLARA VALLEY
GROUNDWATER BASIN

MUNICIPAL WELLS

5000 0 5000
SCALE IN FEET

DECEMBER 1984

FIGURE III- 6

TABLE III-2
PRIVATE WATER SUPPLY WELLS
GROUNDWATER PRODUCTION 1982-83

SECTION NUMBER	NUMBER OF PRIVATE AND AGRIC. WELLS	TOTAL PRIVATE WELL PROD. (ACRE-FEET)
05S1E31	1	0.80
05S1E32	3	1.00
05S1W35	1	0.52
05S1W36	1	1.89
05S2W31	9	1.94
05S2W32	1	0.00
05S2W36	1	16.07
05S3W35	2	0.14
05S3W36	17	7.53
06S1E05	1	0.20
06S1E06	2	0.34
06S1E08	2	0.00
06S1E15	2	1.12
06S1E16	4	1.76
06S1E17	9	13.80
06S1E18	8	3.30
06S1E19	9	4.29
06S1E20	14	6.61
06S1E21	6	1.25
06S1E22	2	0.00
06S1E26	2	0.00
06S1E27	3	2.76
06S1E28	11	4.40
06S1E29	48	148.39
06S1E30	2	23.43
06S1E31	5	15.32
06S1E32	2	180.01
06S1E33	3	8.76
06S1E34	1	0.00
06S1E35	2	3.86
06S1W01	5	2.38
06S1W02	1	0.00
06S1W09	1	0.00
06S1W10	3	20.84
06S1W11	15	310.69
06S1W12	14	12.87
06S1W13	2	5.40
06S1W14	14	4.95
06S1W15	3	0.50
06S1W16	2	0.00
06S1W19	3	1.68
06S1W20	1	3.82
06S1W21	1	114.65
06S1W22	3	158.53
06S1W23	4	11.88
06S1W24	2	17.81
06S1W25	5	0.40

GROUNDWATER PRODUCTION 1982-83

SECTION NUMBER	NUMBER OF PRIVATE AND AGRIC. WELLS	TOTAL PRIVATE WELL PROD. (ACRE-FE
06S1W26	1	1.42
06S1W27	1	0.53
06S1W28	1	31.10
06S1W29	1	36.02
06S1W30	2	0.00
06S1W31	1	7.18
06S1W32	3	1.20
06S1W33	1	0.00
06S1W34	2	431.68
06S1W35	1	1,381.16
06S1W36	2	0.30
06S2W06	28	5.21
06S2W07	15	2.21
06S2W08	12	7.08
06S2W09	72	21.23
06S2W10	4	1.80
06S2W15	18	34.78
06S2W16	31	9.27
06S2W17	1	7.47
06S2W18	9	16.90
06S2W19	1	15.65
06S2W20	1	12.98
06S2W21	1	0.70
06S2W22	1	4.46
06S2W23	10	220.86
06S2W24	6	0.85
06S2W25	2	232.03
06S2W26	5	0.00
06S2W27	1	16.15
06S2W28	2	0.00
06S2W29	4	0.00
06S2W30	6	5.13
06S2W31	4	11.58
06S2W32	1	0.05
06S2W33	3	194.45
06S2W34	2	40.14
06S2W35	1	0.00
06S2W36	2	0.00
06S3W01	28	8.64
06S3W02	3	0.42
06S3W03	1	0.00
06S3W11	1	0.00
06S3W12	3	0.00
06S3W13	4	1.40
06S3W24	1	3.08
06S3W25	3	0.76
07S1E01	1	0.00

GROUNDWATER PRODUCTION 1982-83

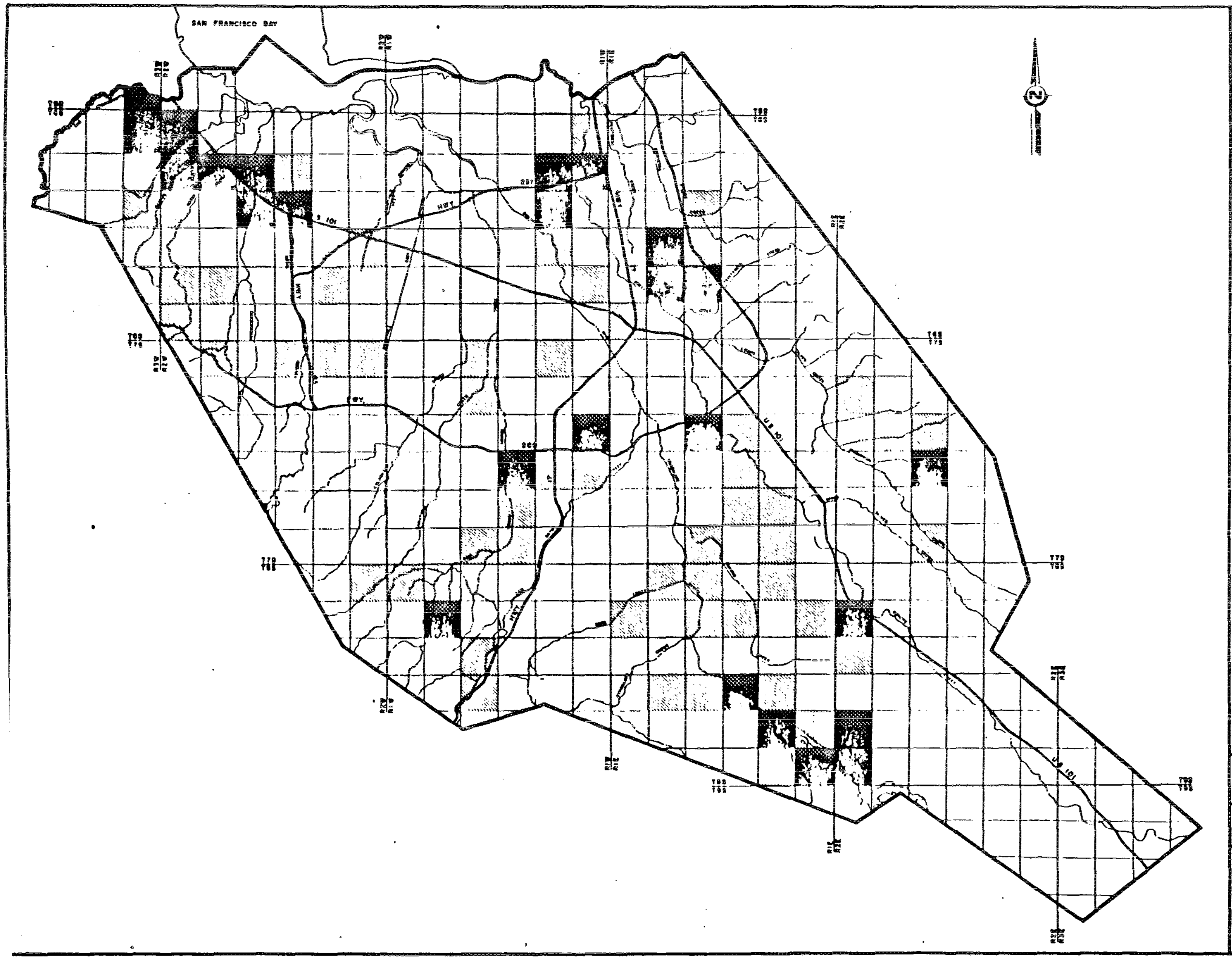
SECTION NUMBER	NUMBER OF PRIVATE AND AGRIC. WELLS	TOTAL PRIVATE WELL PROD. (ACRE-FEET)
07S1E02	2	0.76
07S1E03	1	83.81
07S1E05	1	0.00
07S1E06	3	0.04
07S1E07	10	15.77
07S1E08	2	3.24
07S1E09	9	0.00
07S1E10	2	0.00
07S1E12	2	1.51
07S1E13	2	0.60
07S1E15	6	1.10
07S1E16	12	172.55
07S1E17	1	0.00
07S1E18	2	190.56
07S1E20	9	36.55
07S1E21	8	1,115.29
07S1E22	6	8.04
07S1E23	3	0.00
07S1E24	2	0.00
07S1E25	1	0.00
07S1E26	6	0.00
07S1E27	4	5.82
07S1E29	2	0.60
07S1E32	2	16.50
07S1E33	6	21.06
07S1E34	3	1.66
07S1E35	5	3.85
07S1W01	2	0.00
07S1W02	6	0.01
07S1W03	1	1.58
07S1W04	4	0.00
07S1W05	1	0.00
07S1W06	1	47.58
07S1W07	2	19.90
07S1W08	2	0.50
07S1W09	4	1,000.70
07S1W10	1	83.15
07S1W11	2	0.00
07S1W12	1	1.04
07S1W13	14	15.12
07S1W14	1	0.00
07S1W15	2	14.17
07S1W17	1	0.00
07S1W18	1	0.42
07S1W20	1	0.00
07S1W22	16	1.00
07S1W23	7	0.00

GROUNDWATER PRODUCTION 1982-83

SECTION NUMBER	NUMBER OF PRIVATE AND AGRIC. WELLS	TOTAL PRIVATE WELL PROD. (ACRE-FEET)
07S1W24	4	0.00
07S1W26	1	0.00
07S1W27	5	0.00
07S1W31	3	0.50
07S1W32	1	0.00
07S1W33	5	0.00
07S1W34	6	0.00
07S1W35	3	0.00
07S2E06	1	0.00
07S2E07	5	14.96
07S2E08	8	3.37
07S2E09	1	0.30
07S2E16	5	2.95
07S2E17	10	3.71
07S2E18	8	4.00
07S2E19	2	0.90
07S2E20	8	13.99
07S2E21	12	5.00
07S2E28	1	7.08
07S2E29	3	1.10
07S2E33	5	3.03
07S2E34	10	4.97
07S2W01	5	0.00
07S2E02	4	5.46
07S2E03	4	0.00
07S2W05	4	0.73
07S2W06	1	0.00
07S2W09	2	1.70
07S2W11	2	0.00
07S2W12	1	29.65
07S2W13	1	0.00
07S2W15	1	81.16
07S2W16	2	0.00
07S2W22	3	0.12
07S2W23	1	0.00
07S2W25	2	2.29
07S2W26	1	0.00
07S2W36	1	0.00
08S1E01	3	0.56
08S1E02	5	0.52
08S1E03	3	0.00
08S1E04	4	2.64
08S1E05	5	0.00
08S1E07	5	1.90
08S1E08	1	4.08
08S1E09	6	1.56
08S1E10	6	0.00

GROUNDWATER PRODUCTION 1982-83

SECTION NUMBER	NUMBER OF PRIVATE AND AGRIC. WELLS	TOTAL PRIVATE WELL PROD. (ACRE-FEET)
08S1E11	9	1.90
08S1E12	4	14.01
08S1E13	1	270.16
08S1E15	1	0.94
08S1E16	2	0.27
08S1E17	2	0.58
08S1E19	1	0.22
08S1E20	5	1.08
08S1E21	4	140.63
08S1E22	20	10.39
08S1E23	6	2.74
08S1E25	10	5.60
08S1E26	25	8.08
08S1E27	1	0.62
08S1E35	7	1.96
08S1E36	25	10.56
08S1W03	1	0.00
08S1W04	2	0.76
08S1W05	8	4.29
08S1W06	6	2.22
08S1W07	1	2.40
08S1W08	12	3.26
08S1W10	1	0.00
08S1W12	1	0.06
08S1W15	2	0.02
08S1W16	6	0.94
08S1W17	2	0.40
08S1W18	3	0.22
08S1W21	4	0.10
08S1W22	1	0.75
08S1W24	1	0.74
08S2E05	3	2.48
08S2E06	1	3.50
08S2E07	40	1,605.32
08S2E08	1	1,016.09
08S2E16	3	8.22
08S2E17	2	2,916.33
08S2E18	4	2,878.71
08S2E19	1	0.00
08S2E20	2	237.09
08S2E21	1	0.54
08S2E22	1	7.97
08S2E26	2	241.53
08S2E30	14	6.57
08S2E31	50	22.13
08S2E32	1	0.15
08S2W01	5	0.62
08S2W12	1	0.25
09S2E01	1	0.50



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
AND
SANTA CLARA VALLEY WATER DISTRICT

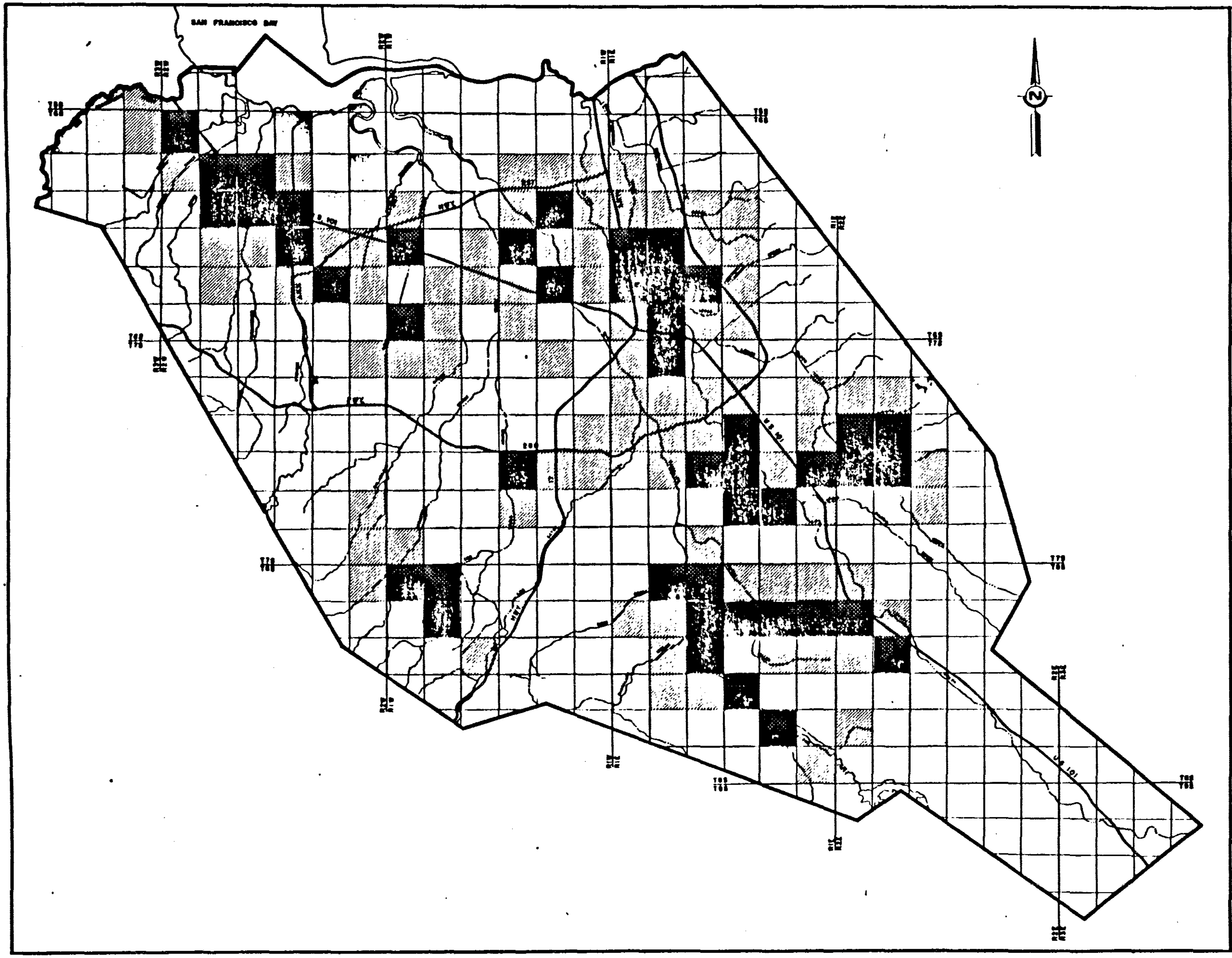
ASSESSMENT OF CONTAMINATION FROM LEAKS OF
HAZARDOUS MATERIAL IN THE SANTA CLARA VALLEY
GROUNDWATER BASIN

PRIVATE WELLS DENSITY

SCALE IN FEET

DECEMBER 1984

FIGURE III- 7



LEGEND

☐ 0

☐ 1-15

▨ 16-30

■ >30 ACTUAL NO. SHOWN

NOTE:

TOTAL NUMBER OF KNOWN WELLS
(i.e. ACTIVE, INACTIVE AND DESTROYED)
BASED ON AVAILABLE S.C.V.W.D. RECORDS.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
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SANTA CLARA VALLEY WATER DISTRICT

ASSESSMENT OF CONTAMINATION FROM LEAKS OF
HAZARDOUS MATERIAL IN THE SANTA CLARA VALLEY
GROUNDWATER BASIN

CONDUITS FOR POTENTIAL CONTAMINANT MIGRATION

JULY 1986

FIGURE III-6

In addition to the above described 258 public and 1,205 private wells which are currently in use there are an additional 800 inactive and 3,000 destroyed wells for which the SCVWD has records. The relative density of all of these wells in each section has been plotted, as shown in Figure III-8, as an indication of the potential for the transfer of contaminated groundwater near the surface to deeper areas of the groundwater basin. The 3,000 "destroyed" wells were included because, in most cases, the wells were destroyed quite a few years ago and the method of destruction is unknown.

The amount of well production, on a sectional basis, is shown in Figure III-9. Review of this figure indicates that the sections where the most groundwater is pumped are located along the southern edge of the confined zone of the subbasin, following Highway 280. These sections, as will be discussed in the next section, are also predominantly (i.e., > 90%) residential areas.

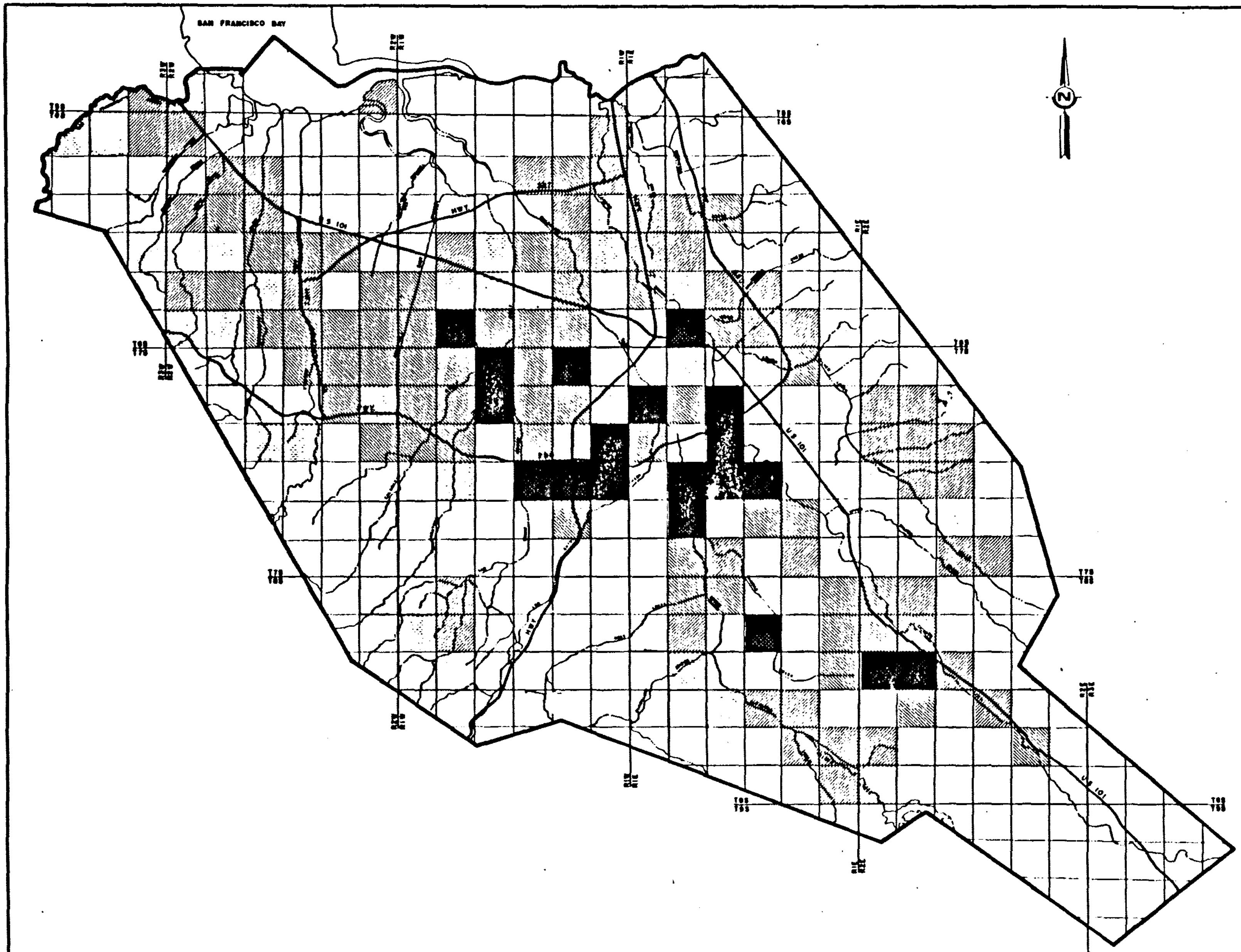
LAND USE IN THE SANTA CLARA VALLEY SUBBASIN

In order to illustrate the general land uses within the Santa Clara Valley subbasin, Figure III-10 was prepared. Five main categories of land use are used to describe existing conditions within the Santa Clara Valley subbasin. These categories include: open space, residential, commercial, industrial, and miscellaneous. Local government landuse maps were utilized as the source information for this map.

In order to illustrate the various land use categories on a meaningful scale, the Santa Clara Valley subbasin was divided in one square mile sections after the Public Lands Survey System township and range grid system. Also, each category was further classified as having greater than 90% of a particular landuse category or greater than 50% but less than 90% of a particular land use category. As shown in Figure III-10, the predominant land use immediately adjacent to San Francisco Bay is open space while in the southern sections of the subbasin it is predominantly residential and open space. Development with light industry generally follows the freeway corridors along U.S. 101, 17 and 680 in the northern sections of the subbasin.

HYDROGEOLOGY OF THE SANTA CLARA VALLEY AND COYOTE SUBBASINS

As previously noted, Santa Clara County is divided into three distinct groundwater subbasins; the Santa Clara Valley, Coyote, and Llagas subbasins (see Figure III-2). A summary of the more important physical properties of the subbasins is shown in Table III-3. As shown in this table the Santa Clara subbasin is the largest of the three subbasins, having a surface area of over 225 square miles, roughly three times the size of the Llagas subbasin.



CALIFORNIA REGIONAL WATER QUALITY CONTROL
SAN FRANCISCO BAY REGION
AND
SANTA CLARA VALLEY WATER DISTRICT

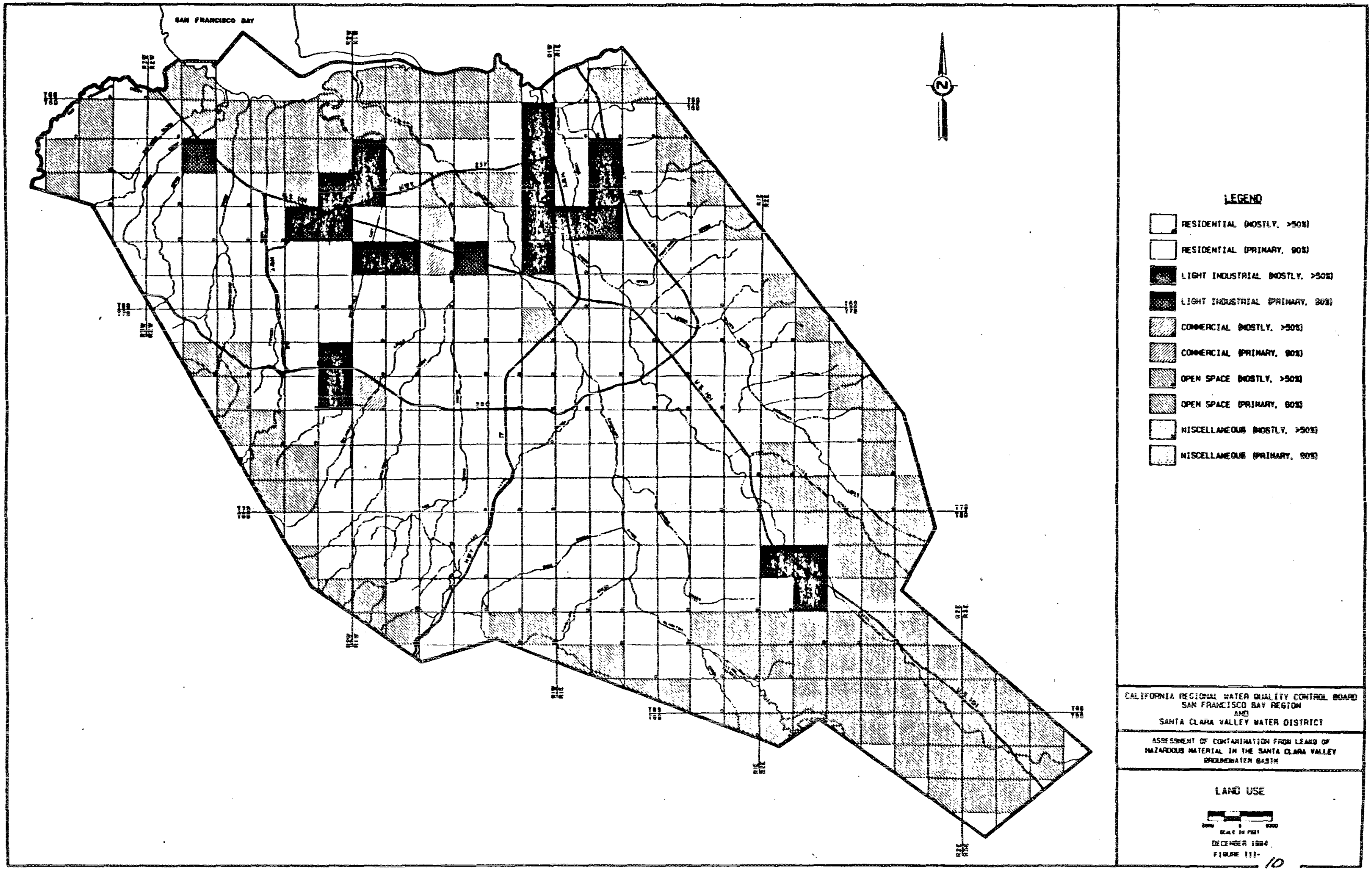
ASSESSMENT OF CONTAMINATION FROM LEAKS OF
HAZARDOUS MATERIAL IN THE SANTA CLARA VALLE
GROUNDWATER BASIN

WELL PRODUCTION (IN ACRE-FEET)

SCALE IN FEET

JULY 1985

FIGURE III-8


SAN FRANCISCO BAY
N
U.S. 101
LEGEND
▢ RESIDENTIAL (MOSTLY, >50%)
▢ RESIDENTIAL (PRIMARY, 90%)
■ LIGHT INDUSTRIAL (MOSTLY, >50%)
■ LIGHT INDUSTRIAL (PRIMARY, 90%)
▨ COMMERCIAL (MOSTLY, >50%)
▨ COMMERCIAL (PRIMARY, 90%)
▧ OPEN SPACE (MOSTLY, >50%)
▧ OPEN SPACE (PRIMARY, 90%)
▢ MISCELLANEOUS (MOSTLY, >50%)
▢ MISCELLANEOUS (PRIMARY, 90%)
5000 0 5000
SCALE IN FEET

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
AND
SANTA CLARA VALLEY WATER DISTRICT

ASSESSMENT OF CONTAMINATION FROM LEAKS OF HAZARDOUS MATERIAL IN THE SANTA CLARA VALLEY GROUNDWATER BASIN

LAND USE

DECEMBER 1984

FIGURE III-10

TABLE III-3

PHYSICAL PROPERTIES OF SANTA CLARA GROUNDWATER BASINS[a]

BASIN	SANTA CLARA VALLEY	COYOTE
DIMENSIONS (miles)		
Length	22	7
Width	15	2
SURFACE AREA (square miles)	225	15
STORAGE VOLUME (acre-feet)	3,225,000[b]	76,000
DEPTHS BELOW SURFACE OF STORAGE VOLUME (feet)	10 - 310[b]	25 - 300

a-Adapted from Reference 43.

b-Reference 13.

The northernmost subbasin is the Santa Clara subbasin which is roughly 15 miles wide and bordered by the San Mateo plains, San Francisco Bay, and the Alameda plains. The southern boundary of the subbasin is at Coyote Narrows which is about one-half mile wide and is located approximately 25 miles from San Francisco Bay.

The Coyote subbasin begins at Coyote Narrows and extends roughly seven miles south to Morgan Hill and the connection with the Llagas subbasin. The Santa Clara Valley and Coyote subbasins are laterally bounded by the Santa Cruz mountains on the west and by the Diablo range on the east.

Principal drainage is represented by Coyote Creek which originates in the Diablo Range, enters Coyote Valley at its southernmost end and flows northwesterly through Coyote Valley and Santa Clara Valley before entering San Francisco Bay. Other major drainages which pass through Santa Clara Valley include the Guadalupe River, Los Gatos Creek, San Tomas Creek, Saratoga Creek, Calabazas Creek, Stevens Creek, and Permanente Creek, all of which originate in the Santa Cruz mountains. Drainages entering Santa Clara Valley from the western slope of the Diablo Range are generally smaller. The larger of these are represented by Penitencia Creek and Berryessa Creek.

The floor of Santa Clara Valley gently slopes from the elevated lateral and southern edges to the subbasin interior. The subbasin interior or baylands is approximately at sea level and is essentially flat. The floor of the Coyote subbasin slopes from the lateral edges of the subbasin towards its center and gently slopes northwesterly to the basin oulet at Coyote Narrows.

Unconsolidated to semi-consolidated alluvial deposits comprise the major aquifers of the Santa Clara and Coyote Valley subbasins. The maximum depth to bedrock in the Santa Clara subbasin is over 1,500 feet while that in the Coyote subbasin is roughly 300 to 400 feet.

Before getting into a discussion of the subbasin boundaries and aquifer systems some of definitions of commonly used terms are appropriate.

Within groundwater studies, geologic formations are divided into two categories, nonwater-bearing and water-bearing formations. Nonwater-bearing formations are those that contain and transmit water in small quantities (i.e., less than a few gallons per minute on an intermittent basis) and are denoted here as consolidated bedrock formations. These formations comprise most of the mountainous areas as well as the basement boundaries of the subbasins. These formations are usually older than one million years.

Water-bearing formations are those that contain and transmit water in large quantities on a sustained basis. These formations are represented by the alluvial fill and the unconsolidated to lightly consolidated Santa Clara formation. These formations are generally less than 10,000 years old.

As streams flow down into a basin interior, heavier, coarser sediments are deposited first while lighter, finer materials are carried the furthest into the basin interior. Therefore, the elevated edges of a basin are characterized by permeable deposits while the interior of a basin is characterized by less permeable deposits. The permeable coarse grained beds and stream channel deposits represent aquifers while the less permeable to essentially impermeable silt and clay beds represent aquitards.

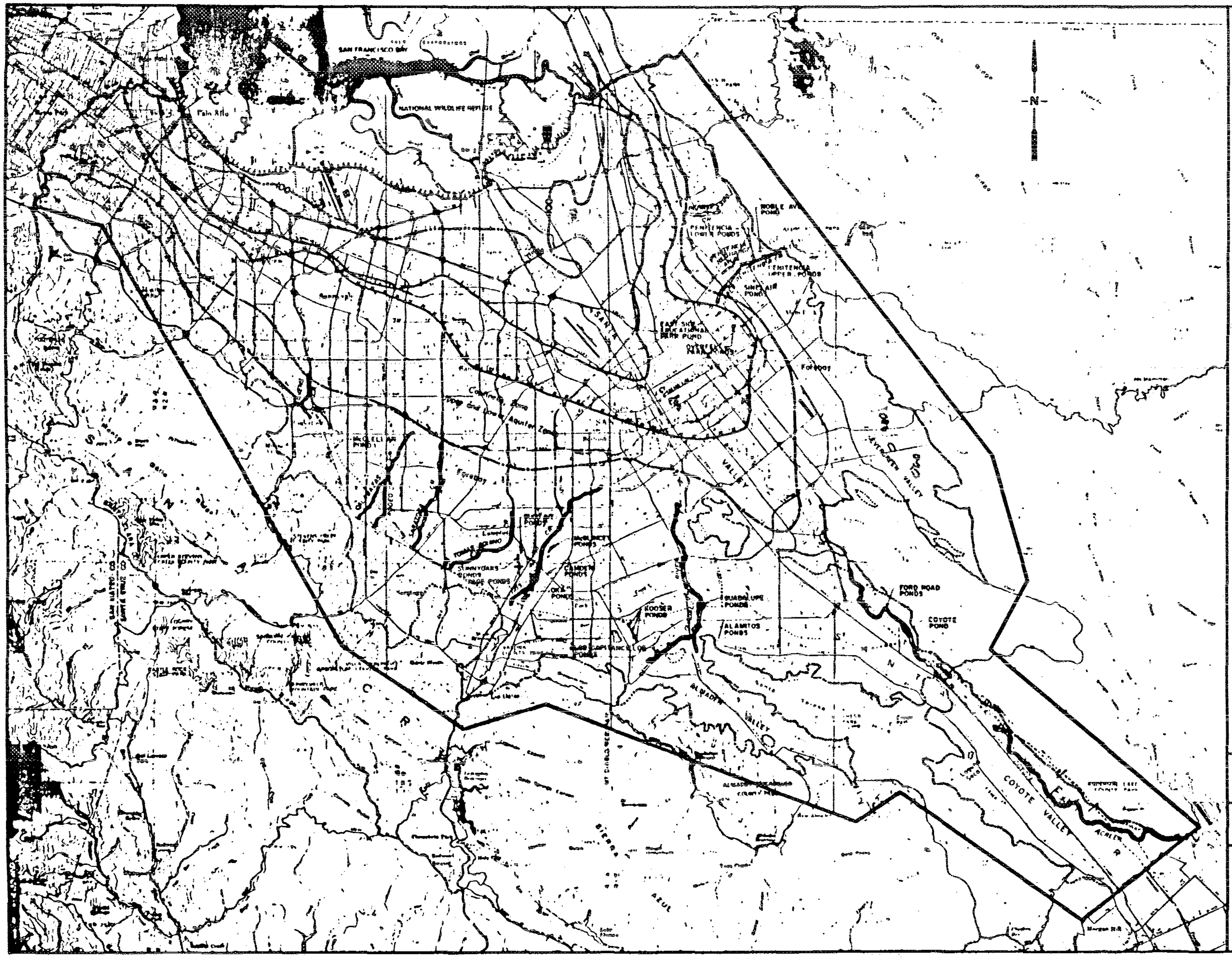
SANTA CLARA VALLEY SUBBASIN HYROGEOLOGY

The study area boundary (Figure III-11) was extended beyond the subbasin boundary to include a portion of the foothills since they tend to influence the quantity and quality of the subbasin groundwater. The subbasin boundary, as shown in Figure III-11, is along the edge of the valley fill.

The aquifer system within the Santa Clara Valley subbasin is divided into the following hydrogeologic units: 1) forebay, 2) upper aquifer zone, and 3) lower aquifer zone.

The forebay area, as shown in Figure III-11, occurs along the elevated edges of the subbasin in the upper alluvial areas. The forebay consists, predominantly, of aquifer materials with discontinuous or leaky aquitards. Here groundwater occurs unconfined, or under water table conditions. The Santa Clara Valley groundwater subbasin receives its principal recharge in the forebay by deep infiltration from streams, applied irrigation waters in excess of evapotranspiration, rainfall, and percolation ponds operated as part of the SCVWD's artificial recharge operations. Much smaller amounts are recharged as subsurface inflow from the Coyote Valley subbasin through Coyote Narrows and as hidden recharge from the nonwater-bearing formations that laterally bound the subbasin.

Within the interior of the subbasin an extensive silt and clay confining layer, as shown in Figure III-12, separates the water producing layers into two main water-bearing zones (aquifers): the upper aquifer zone and the lower aquifer zone. The upper aquifer zone is defined by the SCVWD to include those aquifers that occur within the first 150 feet from the ground surface and the lower aquifer zone includes those aquifers occuring below 150 feet. Cross-sections of the Santa Clara subbasin shown in Figures III-13, 14, and 15 illustrate the two zones. These cross-sections indicate that in the middle of the subbasin the confining bed occurs at approximately 150 to 250 below the ground surface and in the bayland area of the subbasin occurs at depths ranging from 100 to 150 feet. The maximum thickness of the alluvial fill within the subbasin is in excess of 1,500 feet. The principal soil types within the subbasin are shown in Figure III-16. Review of this figure again illustrates



LEGEND

●●●●●●●●●●●●	BASIN BOUNDARY
—●—●—	CONFINED BOUNDARY BETWEEN FOREBAY AND CONFINED AREAS. BOUNDARY IS APPROXIMATE
○	AREA OF FLOWING ARTESIAN WELLS OF THE LOWER CONFINED AQUIFER CIRCA 1920 (CLARK, 1924). BOUNDARY IS APPROXIMATE
○	AREA OF FLOWING ARTESIAN WELLS OF THE LOWER CONFINED AQUIFER PRIOR TO 1920 (CLARK, 1924). BOUNDARY IS APPROXIMATE
○	AREA OF HISTORIC MARSHLANDS OF SOUTH SAN FRANCISCO BAY, EXTENDING TO SHORE OF THE BAY (NICOLS & WRIGHT, 1971)
○ 100	AREA OF SALTWATER INTRUSION ENCOMPASSED BY THE 100 MG/L CHLORIDE CONTENT LINE IN THE UPPER AQUIFER ZONE (IWAMURA, SEPT. 1980)
▬	LOCATIONS OF GROUNDWATER RECHARGE BASINS & ARTIFICIAL RECHARGE AREAS ALONG STREAMS

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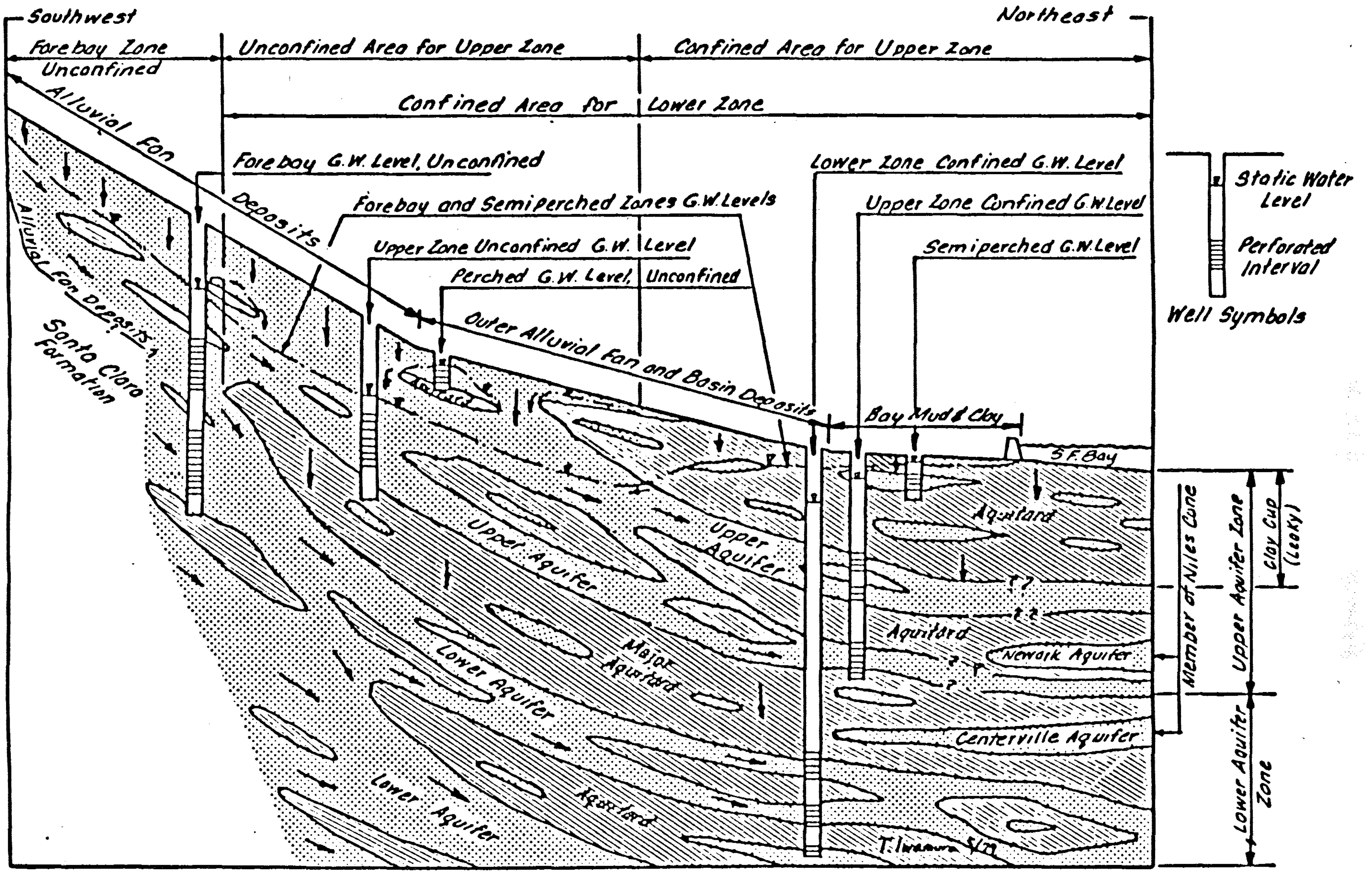
GROUNDWATER BASIN

HYDROGEOLOGIC FEATURES MAP
SANTA CLARA AND COYOTE VALLEYS

5000 0 5000
SCALE IN FEET

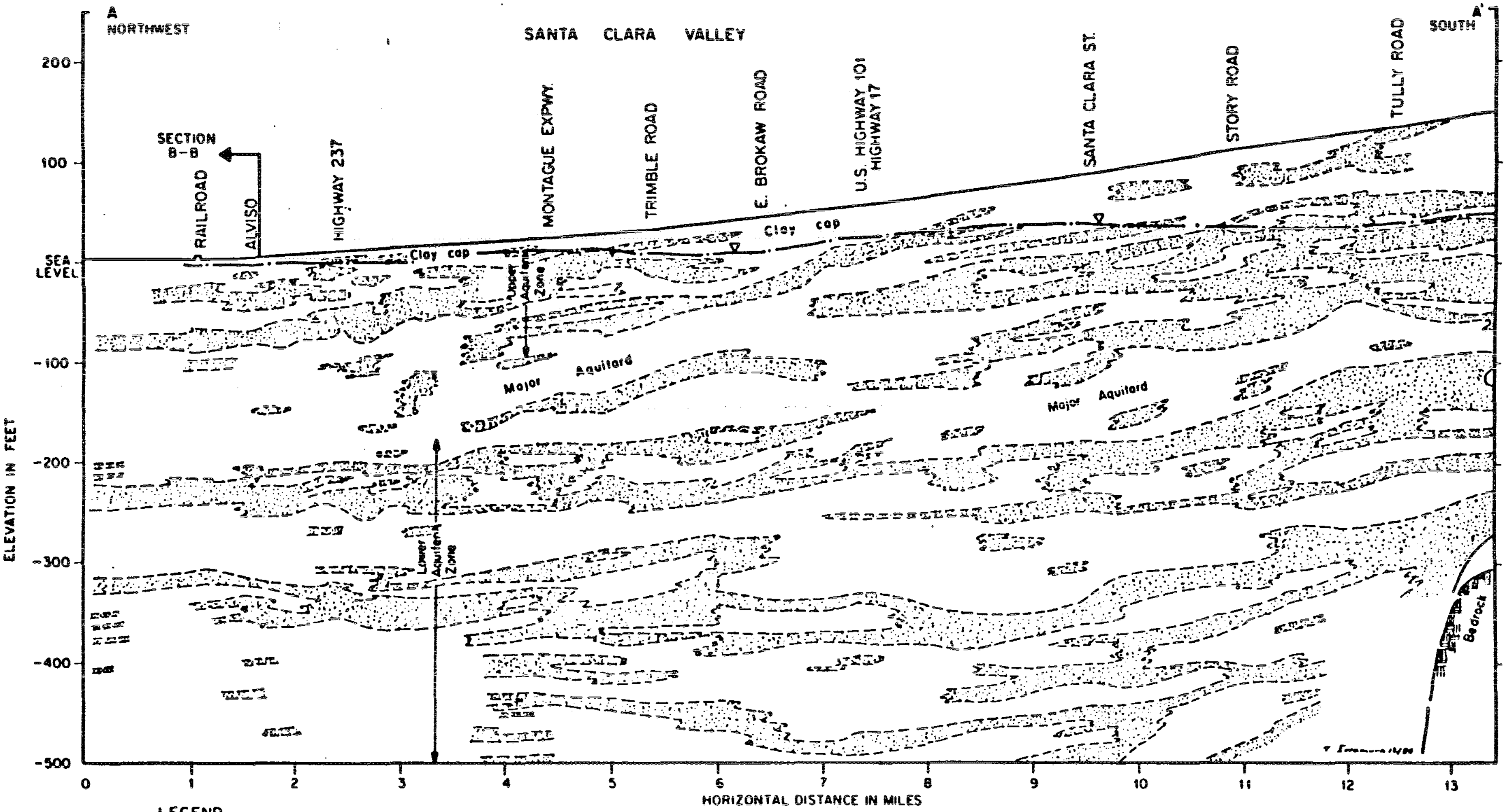
DECEMBER 1984

FIGURE III



NOTES: 1. Arrows indicate direction of groundwater movement without regard to quantity.
2. Grossly exaggerated vertical scale.
3. From Iwamura, 1980

IGURE III-12 DIAGRAMMATIC GEOLOGIC PROFILE DEPICTING MODES OF OCCURRENCE OF GROUNDWATER, PALO ALTO – MOUNTAIN VIEW AREA



LEGEND

▨ DISTINGUISHABLE AQUIFERS--MIXTURES OF GRAVEL AND SAND, MEDIUM TO VERY HIGH PERMEABILITIES.

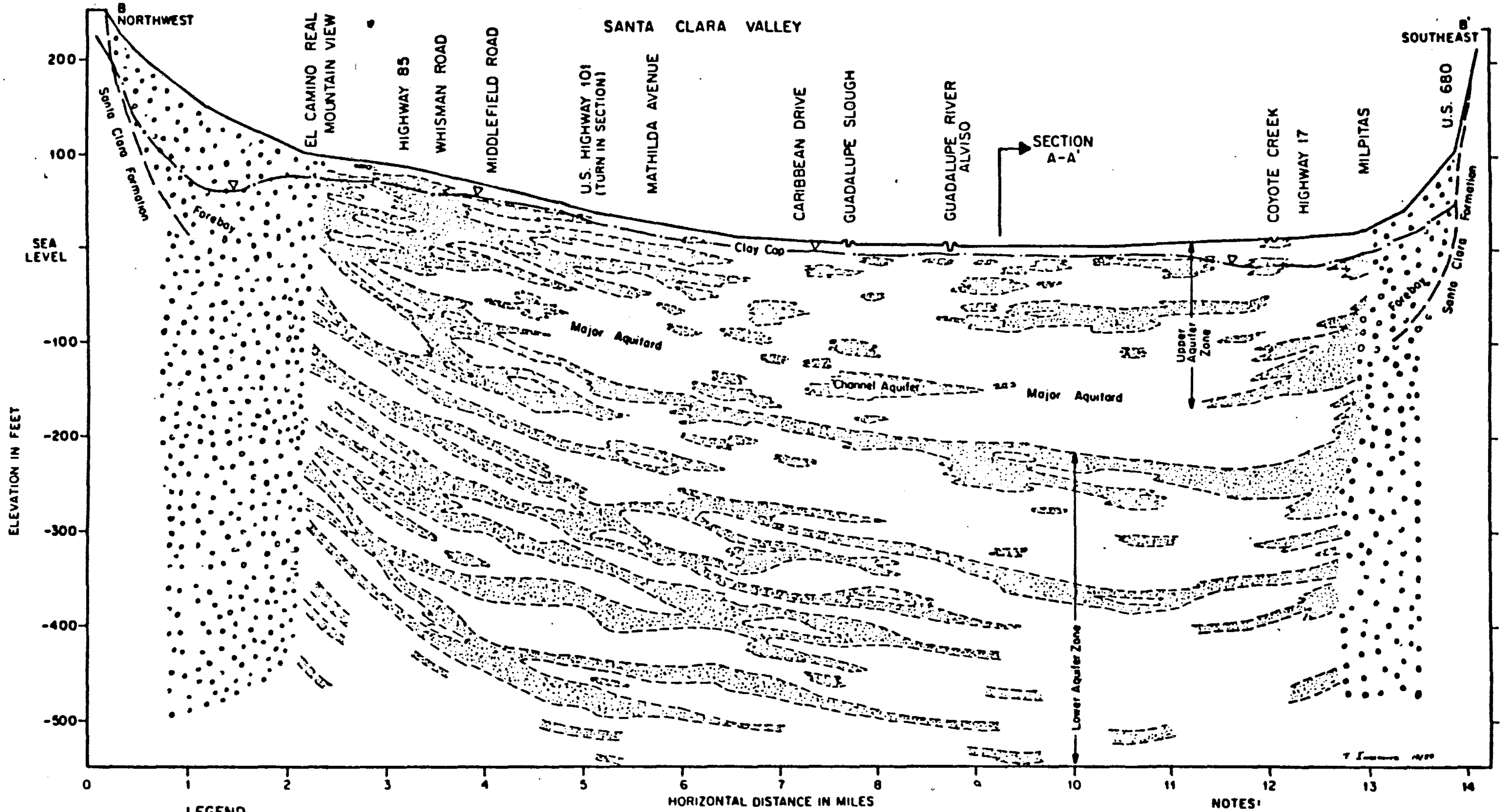
☐ AQUITARD-- MIXTURES OF CLAY AND SILT, WITH SOME SAND AND GRAVEL, LOW TO VERY LOW PERMEABILITIES

▽ — APPROXIMATE WATER TABLE, 1984

NOTES:

1. REFER TO FIGURE III-3 FOR LOCATION OF SECTION.
2. INTERPRETIVE SECTION BASED UPON AVAILABLE WELL LOGS.
3. AQUIFERS ARE GROUPED INTO UPPER AQUIFER ZONE AND LOWER AQUIFER ZONE, SEPARATED BY "MAJOR" AQUITARD.

FIGURE III- 13 · INTERPRETIVE GEOLOGIC SECTION, A—A'
SANTA CLARA VALLEY



LEGEND

▯ DISTINGUISHABLE AQUIFERS--MIXTURES OF GRAVEL AND SAND. MEDIUM TO VERY HIGH PERMEABILITIES.

▨ UPPER ALLUVIAL FAN DEPOSITS--HETEROGENEOUS MIXTURE OF AQUIFERS AND AQUITARDS WHICH CANNOT BE DISTINGUISHED AS INDIVIDUAL LAYERS. MEDIUM TO HIGH PERMEABILITIES

☐ AQUITARD--MIXTURES OF CLAY AND SILT, WITH SOME SAND AND GRAVEL, LOW TO VERY LOW PERMEABILITIES

▽ APPROXIMATE WATER TABLE, 1984

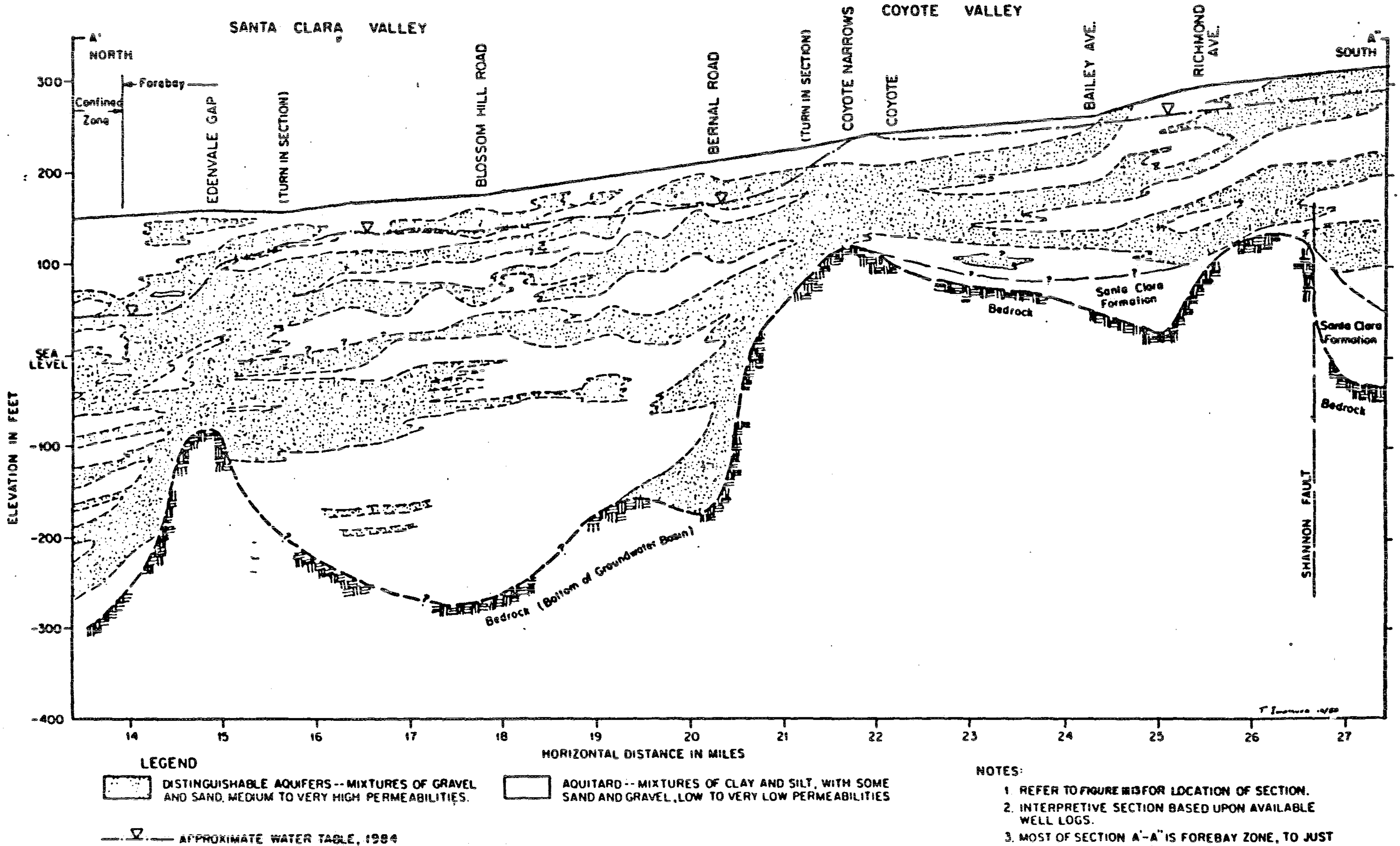
~~FIGURE III-12~~-INTERPRETIVE GEOLOGIC SECTION, B-B'

SANTA CLARA VALLEY

NOTES:

1. REFER TO FIGURE III-13 FOR LOCATION OF SECTION.
2. INTERPRETIVE SECTION BASED UPON AVAILABLE WELL LOGS.

FIGURE III-15

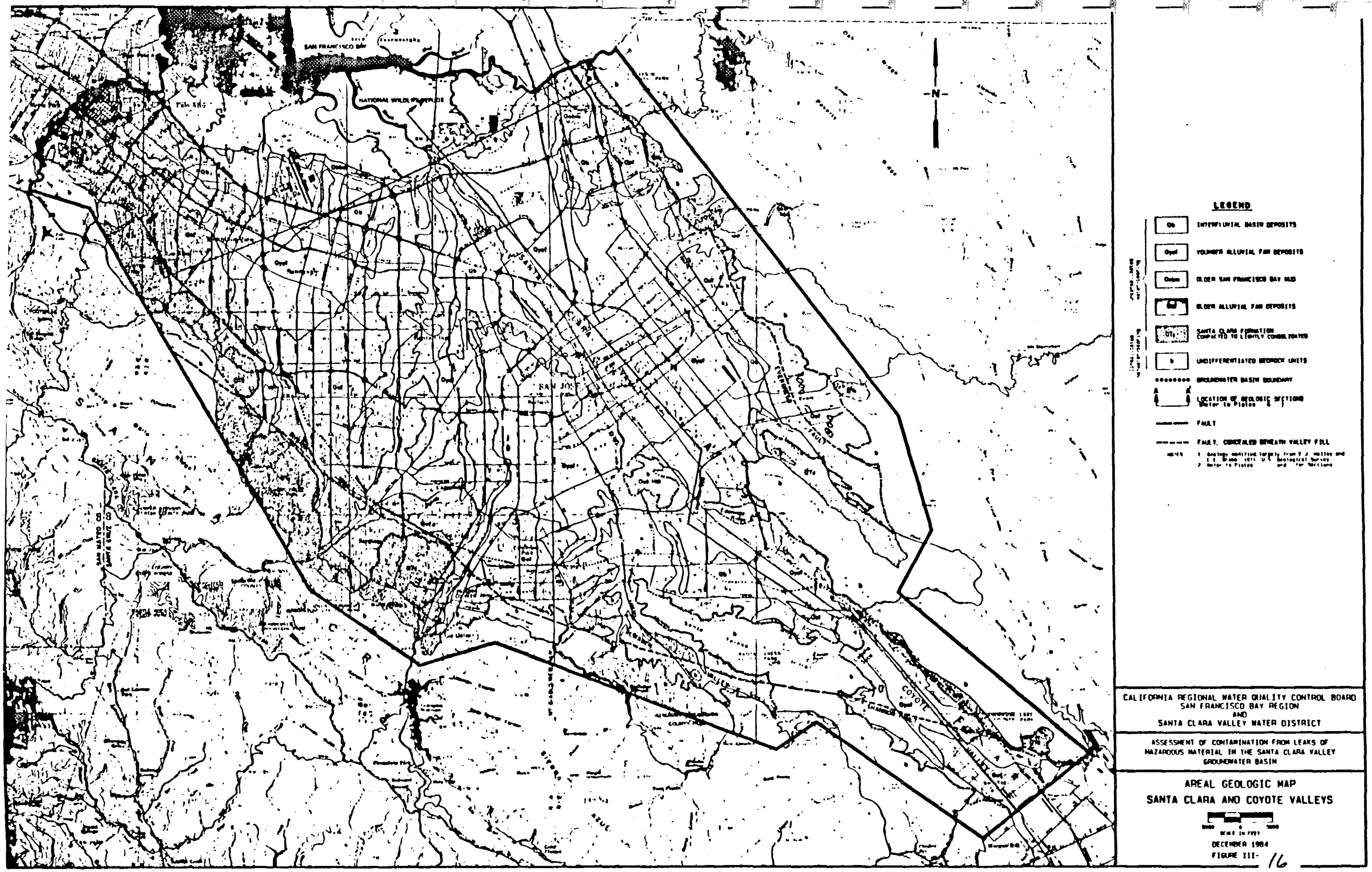


NOTES:

1. REFER TO FIGURE III-13 FOR LOCATION OF SECTION.
2. INTERPRETIVE SECTION BASED UPON AVAILABLE WELL LOGS.
3. MOST OF SECTION A'-A" IS FOREBAY ZONE, TO JUST PAST EDENVALE GAP.

~~FIGURE III-11~~-INTERPRETIVE GEOLOGIC SECTION, A'–A"
PORTIONS OF SANTA CLARA AND COYOTE VALLEYS

FIGURE III- 14


SAN FRANCISCO BAY
NATIONAL WILDLIFE REFUGE
Palo Alto
-N-
SANTA CLARA
SAN JOSE
COYOTE
VALLEY
FAULT
Qb
Qyaf
Qoaf
QTs
LEGEND
Qb INTERFLUVIAL BASIN DEPOSITS
Qyaf YOUNGER ALLUVIAL FAN DEPOSITS
Qobm OLDER SAN FRANCISCO BAY MUD
Qoaf OLDER ALLUVIAL FAN DEPOSITS
QTs SANTA CLARA FORMATION COMPACTED TO LIGHTLY CONSOLIDATED
b UNDIFFERENTIATED BEDROCK UNITS
GROUNDWATER BASIN BOUNDARY
A A' LOCATION OF GEOLOGIC SECTIONS Refer to Plates
FAULT
FAULT, CONCEALED BENEATH VALLEY FILL
NOTES 1 Geology modified largely from E. J. Helley and U. S. Geological Survey
2 Refer to Plates and for Sections

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AREAL GEOLOGIC MAP
SANTA CLARA AND COYOTE VALLEYS

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FIGURE III- 16

that soils in the center of the subbasin are less permeable than those in the forebay area. This figure will be used further in the section dealing with basin sensitivity to groundwater contamination.

Principal recharge to the subbasin occurs by deep infiltration in the elevated lateral and southern forebay areas of the subbasin as shown in Figure III-11. From these elevated areas, the general movement of groundwater is toward the center of the subbasin and San Francisco bay. This general regional groundwater gradient is locally modified in areas of heavy groundwater pumping which results in gradients towards the wells.

COYOTE VALLEY SUBBASIN HYDROGEOLOGY

The Coyote Valley subbasin is laterally bounded by the Santa Clara Formation along its eastern side and by bedrock of the Santa Cruz mountains on its western side.

The bulk of the water-bearing alluvial fill emanates from Coyote Creek as it enters the Valley floor from the east side of the Diablo Range. During geologic development of the subbasin, the alluvium spread out unevenly on the floor of the Coyote Valley leaving lesser amounts of alluvial materials on the west side as opposed to the east.

The maximum thickness of the alluvial fill materials, including the underlying Santa Clara Formation, is approximately 500 feet at the southern end of the subbasin and roughly 150 feet at the northern end (i.e., Coyote Narrows). In general, the alluvium consists of predominantly coarse-grained sediment with lesser interbedding of clay and silt forming aquitards.

Groundwater which occurs in the alluvium is essentially unconfined as it moves in a northwesterly direction down the valley. Under normal conditions, before the installation of an artificial drain system in the Laguna Seca area, part of the subsurface flow seeped to the surface and flowed into Coyote Creek. Even today, along Coyote Creek as it approaches the Coyote Narrows, groundwater rises and seeps into the creek. These seeps are caused by narrow width (one-half mile) and the rise of the basin floor at Coyote Narrows.

Due to the moderate to high permeability of the water-bearing alluvial fill, water levels are quite responsive to stream recharge. Deep percolation of water from Coyote Creek represents the principal recharge to the subbasin. Additional but less significant contributions of recharge are from smaller tributaries of Coyote Creek, irrigation return flows, rainfall, and subsurface inflows from the nonwater-bearing formations along the sides of the subbasin.

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IV. RISK ASSESSMENT RESULTS

As discussed in section II, the risk assessment methodology identifies and assigns values to two main groups of factors: site sensitivity factors (see Table II- 1), which determine the susceptibility of a site to groundwater contamination; and contaminant severity factors (see Table II- 4), which determine the severity and potential to cause groundwater contamination. The intent of this section is to present the results of application of the assessment approach to sites with organic solvent pollution which are located within the Santa Clara Valley subbasin. The following covers: 1) the data base compiled of pollution at sites in the Santa Clara subbasin, 2)the numerical ranking and graphical presentation of the site scores, 3) the uncertainty associated with the site scores, and 4) a basin sensitivity map.

DATA BASE

The data requirements of the assessment methodology were identified in Tables II-1 and II-4. In general, the data required includes the following:

-Information on the hydrogeology of the basin,

-Information on the magnitude of site contamination, and

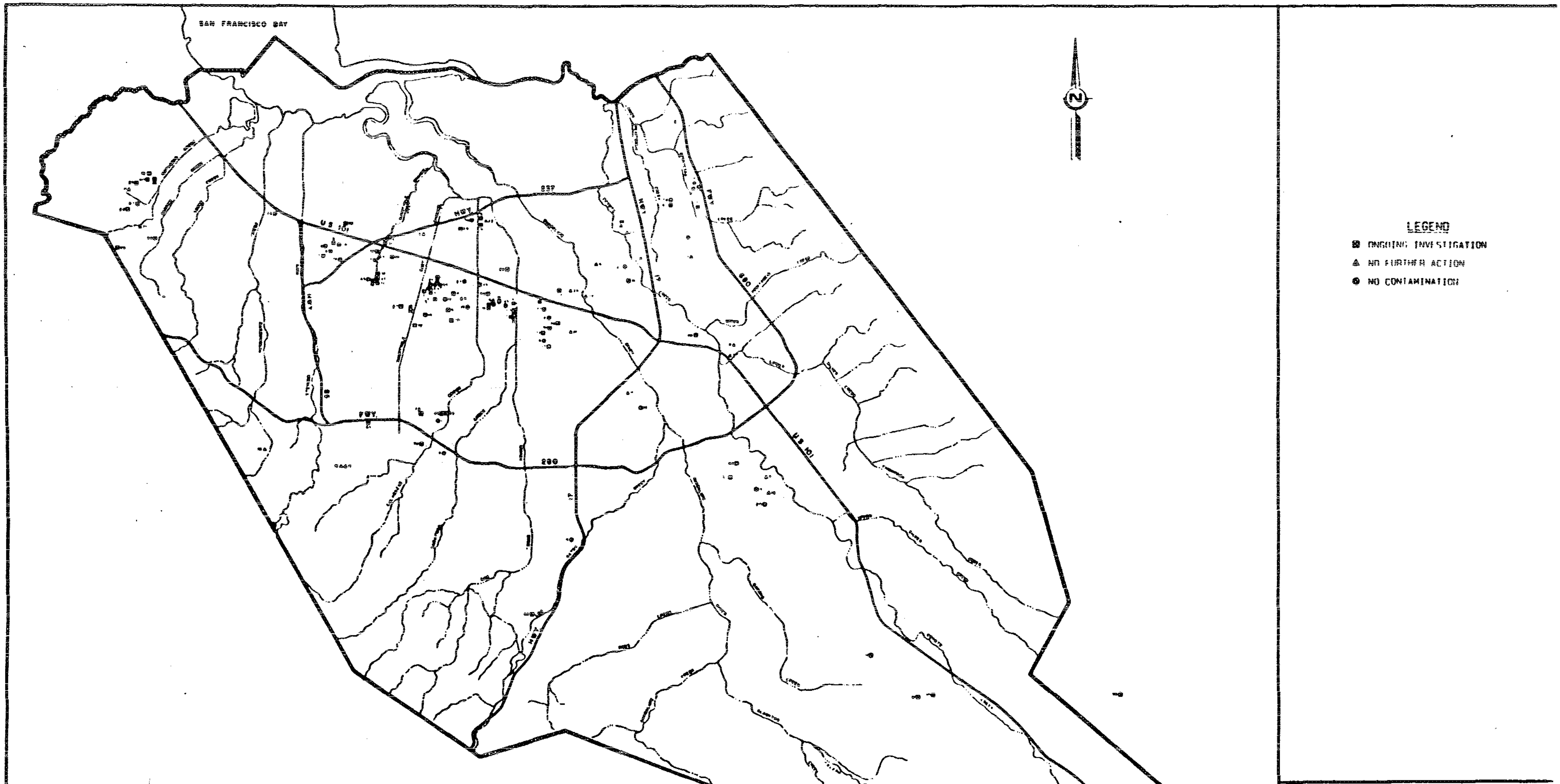
-Information on the physical and chemical properties and the toxicity of the contaminants found.

Data on the subbasin hydrogeology and water supply use were presented in section III. In order to fulfill the remaining two data requirements of the assessment methodology, summaries of the site pollution problem(s) and of the physical and chemical properties and toxicity of the contaminants were prepared. What follows is a discussion of each of these data bases.

Case Summaries

The sites with organic solvent contamination located within the study area (i.e., Santa Clara Valley subbasin) are shown in Figure IV-1 and identified in Table IV-1. As shown, these sites have been placed into one of the following three categories by the Regional Board staff.

1)OG (On-going) - sites for which the Regional Board is requiring investigation of the extent of contamination and development and implementation of cleanup plans.



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GROUNDWATER BASIN

GROUNDWATER CONTAMINATION SITE MAP

JULY 1985

FIGURE IV-1

TABLE IV - 1

On Going (OG) Study Sites

Map	#	City	Facility	Address
OG	1	SV	AMD 901	901 Thompson Pl
	2	SV	Signetics 811	811 E. Arques Ave
	3	SV	AMD 915	915 DeGuigne Dr
	4	SV	MMI	1165 E. Arques Ave
	5	SC	NSC	2900 Semiconductor Dr
	6	MV	Fairchild	464 Ellis St
	7	MV	Intel MV	365 E. Middlefield Rd
	8	MV	Raytheon	350 Ellis St
	9	MV	Siltec	405 National Ave
	10	SJ	Fairchild	101 Bernal Rd
	11	SJ	IBM Cottle	5600 Cottle Rd
	12	SV	UTC	1050 E. Arques Ave
	13	SV	Signetics 740	740 Kifer Rd
	14	SV	Signetics 860	860 Kifer Rd
	15	SC	Memorex	1200 Memorex Dr
	16	SC	Intel Mag	2880 Northwestern Pkwy
	17	SC	Intel SCIII	3000 Oakmead Village Dr
	18	SC	Dysan 5440	5440 Patrick Henry Dr
	19	SC	Dysan 5200	5200 Patrick Henry Dr
	* 20	SJ	SCCT	2240 S. 7th St
	21	MP	Jones Chemical	985 Montague Expy
	22	SC	MMI	2175 Mission College Blvd
	23	SC	Fairchild	Alfred St
	24	PA	HP 1501	1501 Page Mill Rd
	25	PA	HP 640	640 Page Mill Rd
	26	PA	HP Deer Cr	3500 Deer Creek Rd
	27	SV	Westinghouse	401 E. Hendy Ave
	28	MV	Teledyne	1300 Terra Bella Ave
	29	MV	NEC	501 Ellis St
	30	SV	Circo	940 Hamlin Ct
	* 31	SV	Signetics	305 Mathilda Ave
	* 33	SC	Signetics	3600 Tannery Way
	35	SC	Safety-Kleen	3461 Woodward Ave
	36	SC	Monsanto	2710 Lafayette St
	38	SV	Verbatim	360 N. Pastoria Ave
	39	CU	Tandem (Four Phase)	19333 Vallco Pkwy
	40	PA	Stanford Cleaners	2875 El Camino Real
	41	SJ	Van Waters	2256 Junction Ave
	42	PA	HP 395	395 Page Mill Rd
	43	SC	Precision Mono	1500 Space Park Dr
	44	MP	Great Western	945 Ames Ave
	45	CU	Siemens	19000 Homestead Rd
	46	SV	InPrint	968 Stewart Dr
	47	SV	Data General	433 N. Mathilda Ave
	48	MP	Pierce & Stevens	805 Sinclair Frontage Rd
	+ 49	SC	Synertek	3050 Coronado Blvd
	+ 50	SC	Synertek	3001 Stender Way

TABLE IV - 1 OG con't

Map	#	City	Facility	Address
OG	51	SC	Tech Coatings	1000 Walsh Ave
	53	SC	AMI	3800 Homestead Rd
	54	SV	Intersil	1276 Hammerwood Ave
	55	SV	Xidex	305 Soquel Way
	56	SV	Zymos	477 N. Mathilda Ave
	57	SV	TRW	825 Stewart Dr
	58	SV	Exar-Integrated	750 Palomar Ave
	61	SJ	Magnex	6850 Santa Teresa Blvd
	62	MV	Moffett NAS	Moffett Field NAS
	63	SC	Spectra Physics	2905 Stender Way
	66	LG	Becton-Dickinson	14300 Winchester Blvd
	67	MP	Ford	1100 S. Main St
	68	SJ	Solvent Service	1021 Berryessa Rd
	69	SV	Precision Media	1262 N. Lawrence Sta Rd
	70	SV	KTI	1120 Sonora Ave
	71	SC	Pac Nurs Pots	1015 Martin Ave
	72	CU	HP	1100 Wolfe Rd
	75	SV	Micrel (Adv LSI)	639 N. Pastoria Ave
	76	MV	HP	333 Logue Ave
	83	CU	Timex	20650 Valley Green Dr
	84	SJ	Lorentz	1515 S. 10th St
	85	SC	Applied Materials	3050 Bowers Ave
	86	SV	Ampex	728 San Aleso Ave
	87	SV	HP	974 E. Arques Ave
	88	SC	Mag Peripherals	3333 Scott Blvd
	90	SC	Avantek	3175 Bowers Ave
	* 92	SV	Signetics	730 Evelyn Ave
	+ 93	SV	Signetics	897 Stewart Dr
	+ 94	SV	Signetics	848 Stewart Dr
	+ 95	SV	Signetics	830 Stewart Dr
	- 96	SJ	UTC (Coyote Ctr)	Sta.0706, PO Box 358, SV
	97	PA	Aydin	3180 Hanover St
	98	PA	Dura-Bond	3201 Ash St
	99	PA	Fairchild	4001 Miranda Ave

Legend:
* = Insufficient information to document facility status
+ = Synertek: 2 sites adjacent, 1 ranking
Signetics: 3 sites adjacent, included in 811 ranking
- = Site located outside study area

TABLE IV - 1

No Further Action (NA) Study Sites

Map	#	City	Facility	Address
NA	2	SV	Applied Tec	645 Almanor Ave
	3	SJ	Qume	2350 Qume Dr
	4	SJ	Burke	2049 Senter Rd
	5	SJ	IMP	2830 N. 1st St
	6	SC	Sperry	3300 Scott Blvd
	* 7	SJ	Shell Oil	2165 O'Toole Ave
	8	SJ	Economics Lab	640 Lenfest Rd
	9	SV	Amdahl	1250 E. Arques Ave
	11	PA	Beckman	1117 California Ave
	12	SV	Bell Industrie	1161 N. Fairoaks Ave
	13	CU	Zilog Bridge	10440 Bubb Rd
	* 14	SV	Memotronics	1058 W. Evelyn Ave
	15	SJ	SafeWay Chemical	909 Stockton Ave
	16	CU	Zilog Inc	10460 Bubb Rd
	17	SC	Container Corp	2500 De La Cruz Blvd
	18	CU	Kaiser Aluminum	23333 Stevens Creek Blvd
	19	SJ	U.S. Cellulose	520 Parrot St
	21	PA	Watkins Johnson	3333 Hillview Ave
	22	SC	Dysan 5301	5301 Patrick Henry Dr
	23	MP	LSI Logic	1601 McCarthy Blvd
	25	SJ	HP	350 W. Trimble Ave
	26	MP	Harris Microwave	1530 McCarthy Blvd
	27	SJ	DAP	530 Marburg Way
	28	SC	Scientific Gas	3395 De La Cruz Blvd

Legend:
* = Insufficient information to document facility status

TABLE IV - 1

No Contamination (NC) Study Sites

Map		#	City	Facility	Address
NC		1	CU	Intersil	10910 N. Tantau Ave
		2	SC	Owens Corning	960 Central Expy
	*	4	SC	HP	5301 Stevens Creek Blvd
		5	CA	Hi Line Paint	500 Salmare Ave
	*	8	SV	Micromask	695 Vaqueros Ave
		9	SC	Tandy	1600 Memorex Dr
	*	11	SJ	K & H Finishing	2302 Trade Zone Blvd
		13	SJ	IBM S. 10th	2159 S. 10th St
	*	14	SJ	Sealex	582 Stockton Ave
		16	SC	STC Computer	3450 Central Expy
		23	SV	Toshiba	1220 Midas Way
		26	MP	Sierra Chemical	1001 Yosemite Dr
		27	SJ	San Jose Graphics	696 Trimble Rd

Legend:
* = Insufficient information to document facility status

2)NA (no further action) - sites where the Regional Board has indicated that no further action beyond semi-annual monitoring is required at the present time because of the relatively low levels of pollution that were found.

3)NC (no contamination) - sites where the specific compounds investigated during the Regional Board's leak detection program were not found .

Review of Table IV-2 indicates that there are 105 known sites (i.e., NA plus on-going sites) with organic solvent contamination in the study area with the majority, 81 (69 %), in the on-going category.

For each of these sites, a case summary which includes the following information was prepared.

-Description of the site (number of past and present tanks, solvents used, quantity of material),

-Geology of site (soil stratigraphy, hydrogeology, and shallow groundwater gradient),

-Contamination of site (magnitude of soil and/or groundwater contamination, history of problem, and adjacent sites),

-Case chronology - actions taken by Regional Board and site owner/occupant,

-Current status - present stage of investigation at the site (i.e., phase I-initial investigation, phase II -extent of contamination, and phase III-cleanup), and

-References - sources of above information.

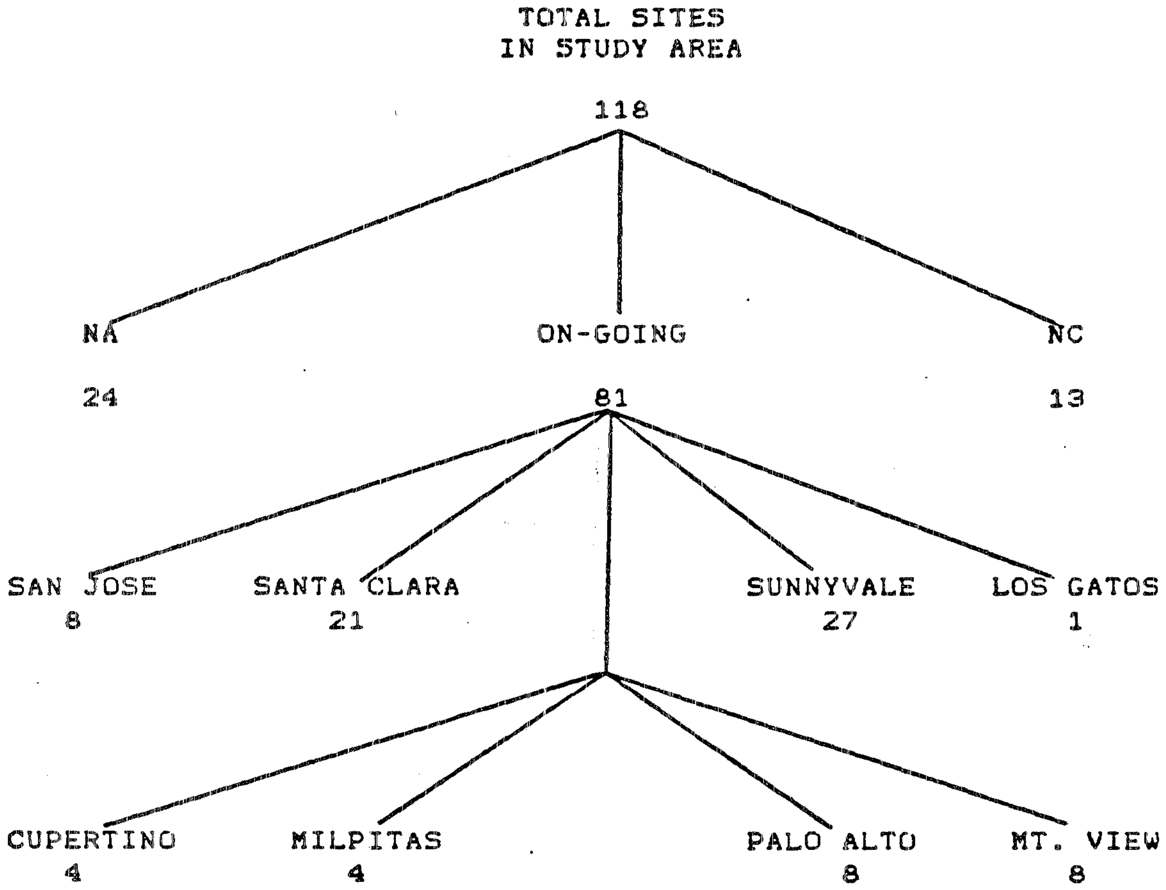
Because of the large number of sites (i.e., 118), the effort necessary to write the case summaries was quite significant. Therefore, the sites were separated into two groups. The first group of sites reviewed include those in the Cities of San Jose, Santa Clara, and Sunnyvale. This first group of summaries covered 81 sites. The data base for these sites, generally, includes data collected through November 1984.

The second group of sites include those located within the Cities of Mountain View, Milpitas, Palo Alto, Cupertino, and Los Gatos. The second group of summaries covered 36 sites. The data base for the second group of sites, generally, includes data collected through May 1985.

Please note that the case summaries do contain some information on the mitigation measures that are planned or have been implemented at these sites, however, this information is not emphasized because it was not the purpose of the case summary. Although information on site clean-up is important, as previously

TABLE IV-2

SUMMARY OF SITE CLASSIFICATIONS



NA = No further action required at the present time

NC = No contamination for specific compounds investigated

ON-GOING = Site investigation and cleanup underway discussed, the assessment is based on worst case conditions. Any subsequent site mitigation could be considered as a future evaluation of the effectiveness of such action relative to the site assessment.

Copies of the case summaries are contained in a separate technical appendix. A general summary of the contaminants found at each site and whether they were found in soil and/or groundwater is contained in appendix 1.

In order to insure that the most up-to-date data were used to prepare the summaries and that it was not misinterpreted, the site owners/occupants were requested to review them. Comments were received on roughly 41% (43 out of 105) of the case summaries (i.e., on-going and N/A sites).

In general, most of the comments received were descriptive (i.e., number of tanks, case chronology, etc.) and were generally accurate and incorporated into the revised case summaries. A few companies had comments relative to data interpretation and, again, were generally accurate and incorporated into the revised summaries.

Several companies had the same general comments which are included here along with our response.

> Comment #1: "Anomalous" lab data should not be included in the risk assessment.
>
> Response: Unless it was shown through repetitive testing (either before or after the questionable sample) that no detection of the contaminant occurred, lab results will be included in the case summaries and subsequent rankings. Variation in lab results can occur for a variety of reasons other than questionable lab analysis and for the purpose of this risk assessment the most conservative estimate of risk will be used.
>
> Comment #2: Chemical concentrations in groundwater reported in case summaries did not reflect current levels present at the site.
>
> Response: For the purpose of this risk assessment, worst case contaminant levels are used. It is impractical to assess relative risk of various sites based on the most current data alone due to the wide temporal variation in chronology of contaminant problems and cleanup programs.
>
> As a measure of progress, the ranking score at any point during the cleanup could be compared to this original score. In fact, a similar ranking could be performed for the projected end points of several cleanup proposals. However, neither of the above was within the scope of this project.

Comment #3: Plume identification is liberal with respect to actual contribution by respective companies.

Response: The risk assessment was not made to assign responsibility of a contaminant plume to any individual company; it is an attempt to relatively rank sites within the study area in order to ascertain where the most significant problems exist. The general rule in defining a plume is the border between clean and dirty wells. If no clean wells exist in a plume with more than one possible contributor, each company is assigned the whole plume.

Chemical Summaries

A list of the most frequently found synthetic organic compounds is shown in Table IV-3 . The majority of the compounds are considered volatile organic compounds (VOCs). Chemical summaries including the following information were compiled for each of the chemicals listed in Table IV-3.

- Synonyms and structure,
- Physical properties: molecular weight, boiling point vapor pressure, solubility, octanol-water coefficient, and sorption coefficient,
- Uses of chemical, detection methods, and environmental fate,
- Toxicity: general harmful effects, irritation data, inhalation and dermal exposure effects data, aquatic data, carcinogenicity data, mutagenic and reproductive data, and
- Federal and State drinking water standards.

The references used to compile this information include the Environmental Protection Agency's (EPA's) ambient water quality criteria documents, EPA's "Water-Related Environmental Fate of 129 Priority Pollutants", and the "Handbook of Environmental Data on Organic Chemicals". Citations for these and other references used to compile this data base are contained in Appendix 2. In addition to the manual methods of literature review, the Registry of Toxic Effects of Chemical Substances (RTECS) and the Toxicological Data Bank (TDB) computer data bases were used to retrieve relevant information.

A summary of the scoring for those compounds used in the site ranking process is shown in Table IV- 4. Review of this table indicates that, in general, data for all factors except dermal LD50 toxicity data and carcinogenicity data were available and uncertainty was limited. The high degree of uncertainty associated with the dermal LD50 and carcinogenicity factors was due to the general lack of data. Copies of the chemical summaries

TABLE IV - 3

20 Most Frequently Found Contaminants

Contaminant	Number of Sites with Contaminant
1,1,1-Trichloroethane	64
Trichloroethylene	60
Trichlorofluoromethane	53
Tetrachloroethene	49
Xylene	47
1,2-Dichloroethylene	44
Toluene	44
Trichloromethane	41
1,1-Dichloroethane	39
1,1-Dichloroethylene	39
Ethyl benzene	36
Methylene chloride	33
Acetone	29
Benzene	27
Isopropyl alcohol	20
Methyl ethyl ketone	17
Vinyl chloride	15
Phthalate esters	14
1,2,4-Trichlorobenzene	12
Phenol	10

TABLE IV - 4

Severity Ranking Scores
For 20 Most Frequently Found Contaminants

Contaminant	Acute Toxicity			Chronic Toxicity		Parameters	
	O-LD50	D-LD50	A-LC50	Carc	Mutag	Ksc	Kow
1,1,1-Trichloroethane (TCA)	1	0-10	3	0-10	10	4-5	2-3
Trichloroethylene (TCE)	1	0-10	3	10b	10	4.5	2
Trichlorofluoromethane (Freon)	0-10	0-10	0-10	0-10	0-10	4	3
Tetrachloroethene (PCE)	0	0-10	3	10b	10	4	3
Xylene	1	0	3	0-10	3	1-3.5	3.5-4
1,2-Dichloroethylene (DCE)	1	0-10	1	0-10	0-10	8	0
Toluene	1	0	3	0-10	10	3.5	3.5
Trichloromethane (Chloroform)	5	0-10	3	10a	10	6	2
1,1-Dichloroethane (DCA)	1	0-10	0-10	0-10	0	7	1
1,1-Dichloroethylene (DCE)	3	0-10	1	10b	3-10	8-10	0
Ethyl benzene	1	1	3	0-10	0-10	1.5	4
Methylene chloride	1	0-10	1	0-10	10	9	0
Acetone	1	0	0	0-10	3	10	0
Benzene	1	0-10	3	10c	10	6	2
Isopropyl alcohol (IPA)	0	0	1	10a	10	10	0
Methyl ethyl ketone (MEK)	1	0	0	0-10	0-10	10	0
Vinyl chloride	3	0-10	3	10c	10	10	0

TABLE IV - 4 con't

Contaminant	Acute Toxicity			Chronic Toxicity		Parameters	
	O-LD50	D-LD50	A-LC50	Carc	Mutag	Ksc	Kow
Phthalate esters *	1	0	10	10b	10	0-5.5	2-10
1,2,4-Trichlorobenzene (TCB)	3	0-10	5	0-10	0-10	0	6.5
Phenol	3	1	3	0	10	8	0

Note:
The higher the number, the greater the severity score.
A range 0-10 indicates complete uncertainty.

Legend:
Acute Toxicity
LD50 = Dose of chemical needed to produce death in 50 % of the exposed animals
LC50 = Concentration of chemical in water needed to produce death in 50 % of exposed aquatic organisms
O-LD50 = Oral Lethal Dose 50
D-LD50 = Dermal Lethal Dose 50
A-LC50 = Aquatic Lethal Concentration 50, 96-hour test
Chronic Toxicity
Carc = Carcinogenicity
10a = Human Suspect
10b = Animal Positive
10c = Human Positive
Mutag = Mutagenicity
Parameters
Log Ksc = Soil Sorption Coefficient
Log Kow = Octanol-Water Coefficient

* Phthalate esters = Dimethyl, Diethyl, Di-n-butyl, Di-n-octyl, Bis(2-ethylhexyl), and Butyl benzyl phthalates

are contained in a separate technical appendix.

PLUME MAPS

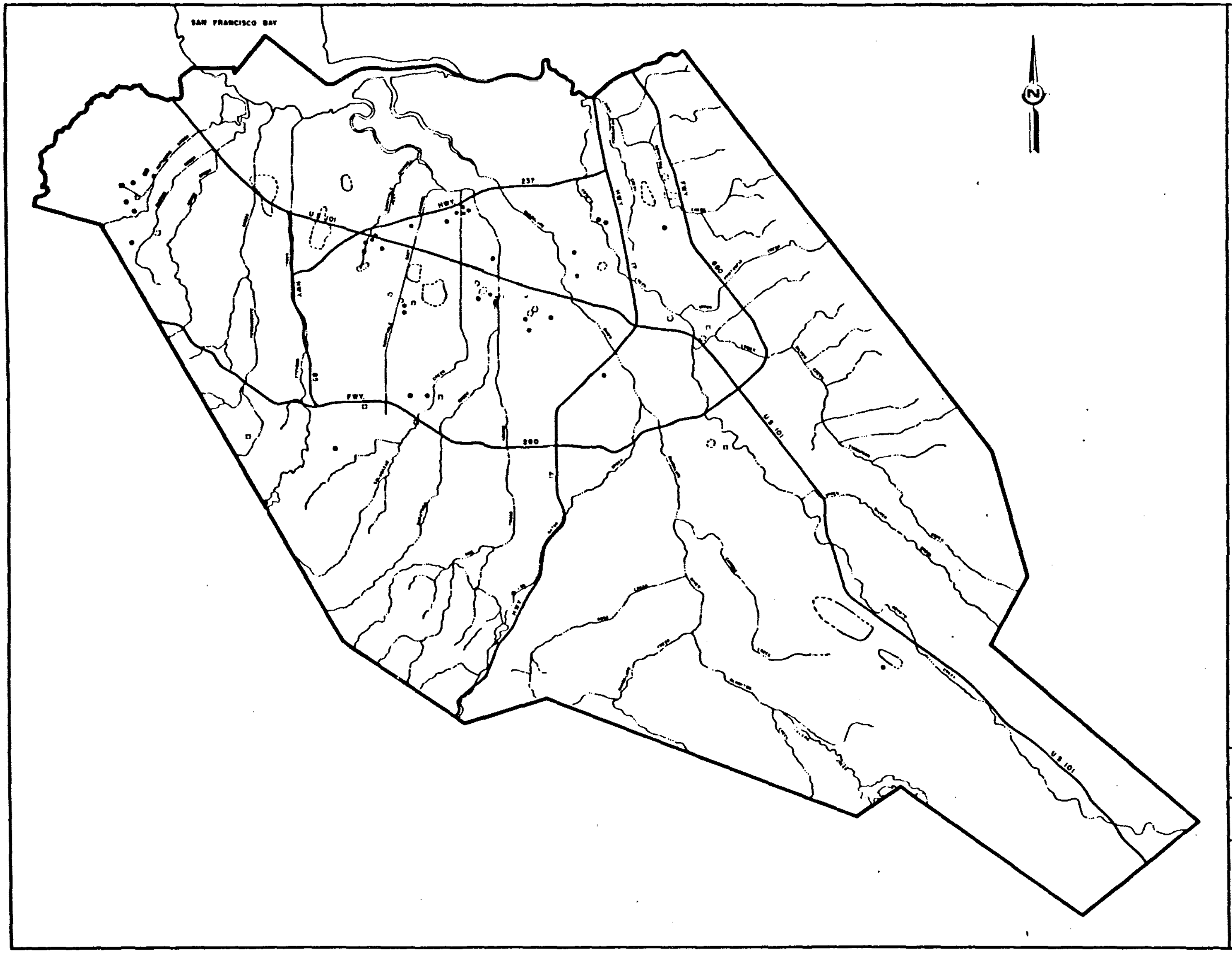
In an effort to illustrate the extent of groundwater pollution within the Santa Clara Valley subbasin, plume maps, as shown in Figures IV-2 and IV-3, of the shallow groundwater and the groundwater below the first aquitard were prepared. Table IV-5 summarizes the groundwater for which data are available for each of the sites. Data used to prepare the maps and table are contained in the case summaries for the sites.

For purposes of developing the plume maps, the shallow groundwater was generally considered as the groundwater encountered in the first 10 to 50 feet of the upper aquifer, and the groundwater below the first aquitard was that generally encountered between 30 to 100 feet of the upper aquifer. The plume maps show the extent of synthetic organic pollution from all chemicals and are not for one particular chemical. The case summaries should be reviewed if a particular site and/or chemical is of interest.

Table IV-5 indicates that information is only generally available in the shallow groundwater and is very limited for deeper aquifers. In addition, review of Figures IV-2 and IV-3 indicate that for eight sites the plumes in the shallow groundwater are essentially defined. In order to define the edge of a plume, compounds in the groundwater had to be less than 10 ppb. For the majority of sites on Figure IV-2, the data was very limited indicating the extent was unknown. For six sites on Figure IV-2, data were only available on soil levels indicating that it was not known whether groundwater contamination exists at the site. The two largest (and fairly well defined) shallow groundwater plumes are in south San Jose at the IBM and Fairchild Camera sites.

Review of Figure IV-3 indicates that, in general, the IBM and Fairchild sites, in the south San Jose area, are the only two sites where sufficient data exists in order to identify the extent of pollution in the groundwater below the first aquitard.

Progress has been made toward definition of the extent of pollution on all sites, but in general, not enough data as illustrated here are available to indicate the extent of groundwater pollution. Three main reasons for this are: 1) the sites with sufficient data are, in general, 18 months ahead in the investigation of the extent of pollution, 2) a large number of sites is being handled by a small number of Regional Board staff engineers, and 3) competition between companies for consulting, laboratory, and well drilling services has led to some delays.



LEGEND

- ● POINT CONTAMINATION - PLUME DEFINED
- ● POINT CONTAMINATION - NO PLUME DEFINED
- □ POINT CONTAMINATION - (SOIL ONLY)
- ○ PLUME DEFINED
- ◌ PLUME NOT WELL DEFINED

NOTES

SHALLOW GROUNDWATER GENERALLY ENCOUNTERED WITHIN THE FIRST 10 TO 50 FEET OF THE UPPER AQUIFER IN THE CONFINED ZONE.

THE AREA SOUTH OF FWY 280 & 680 IS GENERALLY CONSIDERED THE FOREBAY.

SHALLOW GROUNDWATER IN THE FOREBAY IS HYDRAULICALLY CONNECTED TO THE LOWER AQUIFER IN THE CONFINED ZONE.

PLUMES ENCOMPASS MULTIPLE SITES.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOA
SAN FRANCISCO BAY REGION
AND
SANTA CLARA VALLEY WATER DISTRICT

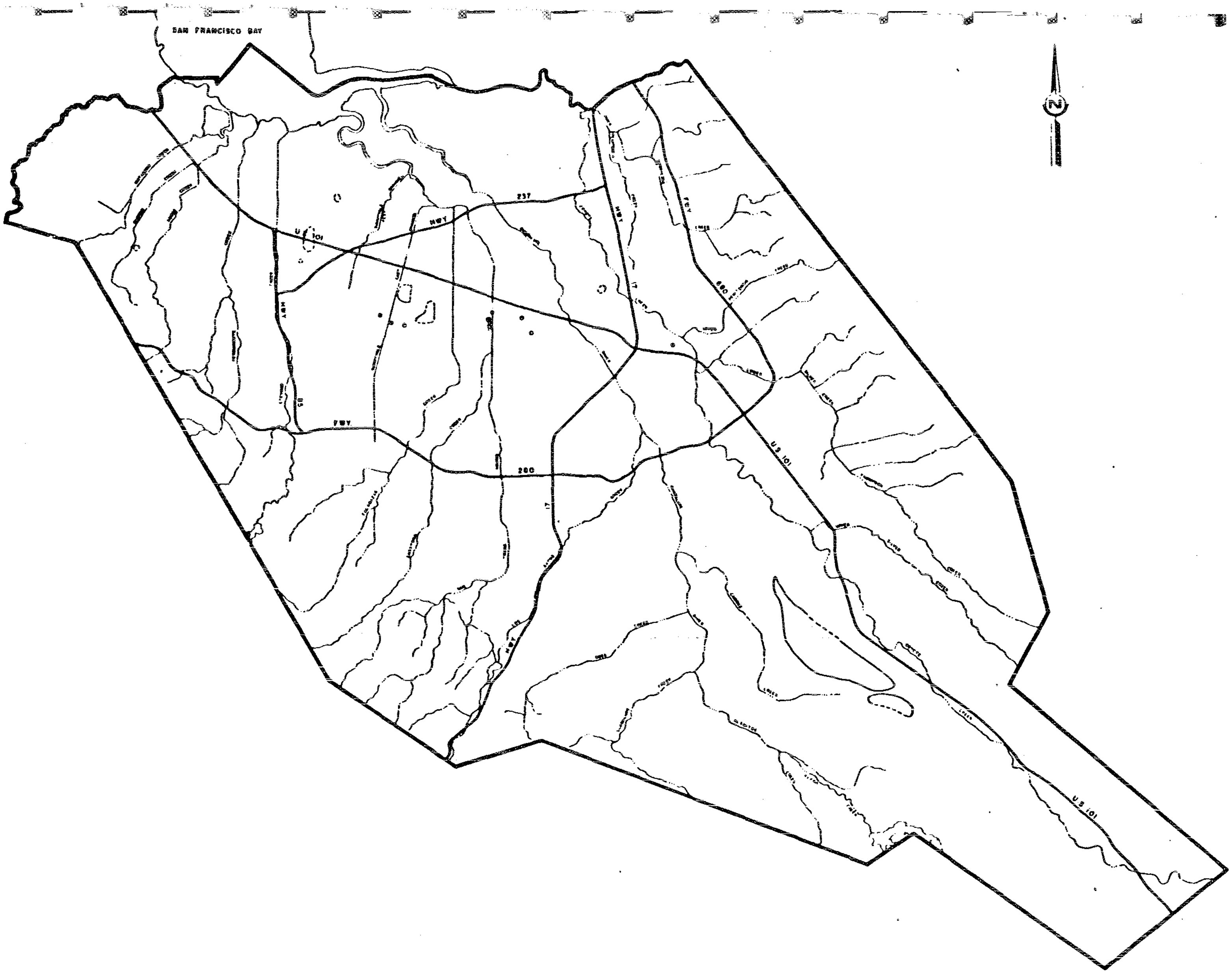
ASSESSMENT OF CONTAMINATION FROM LEAKS OF
HAZARDOUS MATERIAL IN THE SANTA CLARA VALLEY
GROUNDWATER BASIN

GROUNDWATER CONTAMINATION PLUMES
SHALLOW GROUNDWATER

0
SCALE IN FEET

JULY 1985

FIGURE IV-2



LEGEND

- ● POINT CONTAMINATION - PLUME DEFINED
- ● POINT CONTAMINATION - NO PLUME DEFINED
- ☐ POINT CONTAMINATION - (SOIL ONLY)
- ○ PLUME DEFINED
- ◌ PLUME NOT WELL DEFINED

NOTES

GROUNDWATER BELOW THE FIRST AQUITARD IS GENERALLY ENCOUNTERED BETWEEN 30 TO 100 FEET OF THE UPPER AQUIFER IN THE CONFINED ZONE.

THE AREA SOUTH OF FWY 280 & 680 IS GENERALLY CONSIDERED THE FOREBAY.

SHALLOW GROUNDWATER IN THE FOREBAY IS HYDRAULICALLY CONNECTED TO THE LOWER AQUIFER IN THE CONFINED ZONE.

PLUMES ENCOMPASS MULTIPLE SITES.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
AND
SANTA CLARA VALLEY WATER DISTRICT

ASSESSMENT OF CONTAMINATION FROM LEAKS OF
HAZARDOUS MATERIAL IN THE SANTA CLARA VALLEY
GROUNDWATER BASIN

GROUNDWATER CONTAMINATION PLUMES
GROUNDWATER BELOW FIRST AQUITARD

5000 0 5000
SCALE IN FEET

JULY 1985

FIGURE IV-3

TABLE IV - 5

CURRENT EXTENT OF GROUNDWATER INVESTIGATION

Map #	City	Facility	Shallow GW	GW Below First Aquitard	Deeper GW	Plume Symbol
OG 1	SV	AMD - Bldg. 901	x	x	x	5
2	SV	Signetics - 811	x	x	x	5
3	SV	AMD - Bldg. 915	x	x	x	5
4	SV	MMI	x	x	x	5
5	SC	NSC	x	x		5
6	MV	Fairchild	x	x	x	5
7	MV	Intel	x	x	x	5
8	MV	Raytheon	x	x		5
9	MV	Siltec	x			5
10	SJ	Fairchild	x	x	x	4,F
11	SJ	IBM	x	x	x	4,F
12	SV	UTC	x	x		5
13	SV	Signetics - 740	x	x		5
14	SV	Signetics - 860	x	x		5
15	SC	Memorex Corp.	x	x		1
16	SC	Intel Magnetics	x	x		1
17	SC	Intel-SC3	x	x		1
18	SC	Dysan - 5440	x			1
19	SC	Dysan - 5200	x			1
21	MP	Jones Chemical	x			5
22	SC	MMI	x			2
23	SC	Fairchild	x			5
24	PA	HP - 1501 Page Mill	x			2,F

Map #	City	Facility	Shallow GW	GW Below First Aquitard	Deeper GW	Plume Symbol
25	PA	HP - 640 Page Mill	x			2
26	PA	HP - Deer Creek Rd	x			2,F
27	SV	Westinghouse	x	x		5
28	MV	Teledyne	x	x	x	5
29	MV	NEC	x	x		5
30	SV	Circo	x			2
33	SC	Signetics - 3625	x			2
35	SC	Safety-Kleen	x			2
36	SC	Monsanto	x	x		5
38	SV	Verbatim Corp.	x			5
39	CU	Tandem (Four Phase)	x	x	x	3,F
40	PA	Stanford Cleaners	x			2
41	SJ	Van Waters & Rogers	x	x	x	5
42	PA	HP - 395 Page Mill	x	x		2
43	SC	Precision Mono.	x	x		5
44	MP	Great Western	x	x		5
45	CU	Siemens	x			2
46	SV	InPrint	x			5
47	SV	Data General	x			5
48	MP	Pierce & Stevens	x			5
49	SC	Synertek	x	x		5
50	SC	Synertek	x	x		5
51	SC	Technical Coatings	x			5
53	SC	AMI	Soil Samples Only			3
54	SV	Intersil	x			2
55	SV	Xidex	x			5

Map #	City	Facility	Shallow GW	GW Below First Aquitard	Deeper GW	Plume Symbol
56	SV	Zymos	x			5
57	SV	TRW	x	x	x	5
58	SV	Exar-Integrated	x			2
61	SJ	Magnex Corp.	x			2,F
62	MV	Moffett Field	x	x		5
63	SC	Spectra-Physics	Soil Samples Only			3
66	LG	Becton-Dickinson	x			1,F
67	MP	Ford Motor Co.	x	x		5
68	SJ	Solvent Service	x	x		5
69	SV	Precision Media	x			2
70	SV	KTI Chemicals	x			5
71	SC	Pacific Nursery	x			2
72	CU	Hewlett Packard	x			2
75	SV	Micrel (Adv. LSI)	x			2
76	MV	Hewlett Packard	x	x		2
83	CU	Timex	Soil Samples Only			3,F
84	SJ	Lorentz Barrel & Drum	x			5
85	SC	Applied Materials	x			5
86	SV	Ampex Corp.	x			2
87	SV	Hewlett Packard	x			5
88	SC	Magnetic Peripherals	x			5
90	SC	Avantek, Inc.	x			5
92	SV	Signetics - 730	x			2
93	SV	Signetics - 897	x	x		5
94	SV	Signetics - 848	x	x		5
95	SV	Signetics - 830	x	x		5

Map #	City	Facility	Shallow GW	GW Below First Aquitard	Deeper GW	Plume Symbol
96	SJ	UTC (Canyon Ctr)	x	x		5
97	PA	Aydin	Soil Samples Only			3,F
98	PA	Dura-Bond	x			2
99	PA	Fairchild	x	x		5,F
NA 2	SV	Applied Tech.	x			1
3	SJ	Qume	x			2
4	SJ	Burke Industries	x			3
5	SJ	IMP Corp.	x			2
6	SC	Sperry Univac	x			5
8	SJ	Economics Lab	x			3
9	SV	Amdahl	x			2
11	PA	Beckman Intruments	Soil Samples Only			3
12	SV	Bell Industries	x			2
13	CU	Zilog/Bridge	x			2,F
14	SV	Memotronics	x			2
15	SJ	Safe-Way Chemical	x			2
16	CU	Zilog	x			2,F
17	SC	Container Corp.	x			2
18	CU	Kaiser Aluminum	Soil Samples Only			3,F
19	SJ	U.S. Cellulose	x			2
21	PA	Watkins-Johnson	x			2,F
22	SC	Dysan	x			2
23	MP	LSI Logic	x			2
25	SJ	Hewlett Packard	x			2
26	MP	Harris Microwave	x			2
27	SJ	DAP Inc.	x			5

Map #	City	Facility	Shallow GW	GW Below First Aquitard	Deeper GW	Plume Symbol
28	SC	Scientific Gas Prod.	x			2
NC 1	CU	Intersil	x			
2	SC	Owens Corning	x			
4	SC	Hewlett Packard	x			F
5	CA	Hi Line Paints				F
8	SV	Micromask	x			
9	SC	Tandy	x			
11	SJ	K & H Finishing	x			
13	SJ	IBM	x			
16	SC	STC Computer	x			
23	SV	Toshiba	x			
26	MP	Sierra Chemical	x			
27	SJ	San Jose Graphics	x			

Shallow Groundwater = generally encountered within the first 10 to 50 feet of the upper aquifer in the confined zone.

Groundwater Below First Aquitard = generally encountered between 30 to 100 feet of the upper aquifer in the confined zone.

Deeper Groundwater = generally encountered deeper than 100 feet.

Plume Symbol Legend

1	Point contamination, plume well defined
2	Point contamination, plume not defined
3	Soil contamination only
4	Plume well defined
5	Plume not defined
F	Groundwater within Forebay; shallowest groundwater in Forebay is hydraulically connected to lower aquifer in confined zone.

Plume symbols represent the present state of knowledge under worst case conditions of organic solvent contamination in the shallowest groundwater.

SITE RANKING

As discussed in Section III, the first step in ranking a site is to assign a score or range to each of the 24 scales. The scores for all sites in the study area are contained in Appendix 3 of this report. Once the scoring is complete, two alternatives are available for summarizing the data: 1) The two values (i.e., site sensitivity score and contaminant severity score) can be added to obtain a combined score for the site. Sites can then be ranked on the basis of the total numerical score. 2) Alternately, the two values can be plotted to obtain graphical representation of the individual scores.

Numerical Ranking

The numerical scores for the sites located in the study area are shown in Table IV-6. The scores are based on worst case contaminant levels at the sites. They do not, as previously discussed, take into account planned or implemented cleanup efforts. Table IV-7 presents the relative rankings for the sites classified as on-going.

The sites in Table IV-7 were ranked based on the average site scores, thereby taking into account the uncertainty associated with the site. A listing of the uncertainty associated with each site score is shown in Table IV-8.

Review of the data indicates the following:

- approximately 68% of the sites have an average score of > 120 points,
- approximately 6% of the sites have an average score of > 160 points,
- approximately 4% of the sites have an uncertainty value of 92 points, and
- approximately 63% of the sites have an uncertainty value of < 46 points (i.e., less than 20% of the total points).

Graphical Presentation

As shown in Figure II-3, graphical representation allows for an investigation of the interaction of the site sensitivity and contaminant severity values as well as the overall contamination potential associated with the sites. As shown in Figures IV-4 through IV-11, eight separate plots were made from the site scoring data shown in Table IV-6. One plot shows all on-going

TABLE IV - 6

Numerical Scores For On Going (OG) Sites

Facility	Site Score		Contaminant Score		Total
	Low-High	Avg	Low-High	Avg	Lows-Highs
Ampex	49.3-79.3	64	53.7-63.5	59	103.0-142.8
AMD 901	53.8-73.8	64	76.9-84.5	81	130.7-158.3
915	47.8-67.8	58	63.9-71.5	68	111.7-139.3
AMI	69.2-93.2	81	43.7-53.7	49	112.9-146.9
Applied Materials	51-73	62	66.3-87.0	77	117.3-160.0
Avantek	41.2-75.2	58	49-91	70	90.2-166.2
Aydin	41.9-73.4	58	60.5-94.5	78	102.4-167.9
Becton-Dickinson	61.4-69.4	65	73-96	85	134.4-165.4
Circo	39.6-77.6	59	39.0-62.5	51	78.6-140.1
Data General	58.5-80.5	70	39.9-49.6	45	98.4-130.1
Dura-Bond	54.5-78.5	67	46.8-76.5	62	101.3-155.0
Dysan 5200	36.6-56.6	47	56.1		92.7-112.7
5440	38.1-48.1	43	57.1-77.1	67	95.2-125.2
Exar-Integrated	38.2-76.2	57	43.5-53.5	49	81.7-129.7
Fairchild MV	68-79	74	84.5-89.5	87	152.5-168.5
PA	51.7-65.7	59	80.5-89.5	85	132.2-155.2
SJ	81.4-87.9	85	72.7-84.7	79	154.1-172.6
SC	58.2-78.2	68	51.2-60.7	56	109.4-138.9
Ford	50.8-81.4	66	67.7-87.2	77	118.5-168.6
Great Western	38-51	45	78.0-86.5	82	116.0-137.5
HP MV	62.5-76.5	70	39.0-48.7	44	101.5-125.2
Cu	71.3-85.3	78	45-55	50	116.3-140.3
Deer Cr	45-59	52	72.0-81.5	77	117.0-140.5
395 PM	58.3-82.3	70	37.5-47.5	43	95.8-129.8
640 PM	47.7-62.2	55	60.5-69.5	65	108.2-131.7
1501 PM	46.6-57.6	52	68.2-77.2	73	114.8-134.8
SV	46.8-84.8	66	52.0-75.5	64	98.8-160.3
IBM Cottle	88.3-94.8	92	79-91	85	167.3-185.8

TABLE IV - 6 OG con't

Facility	Site Score		Contaminant Score		Total
	Low-High	Avg	Low-High	Avg	Lows-Highs
InPrint	41-79	60	37.2-48.7	43	78.2-127.7
Intel MV	69.5-83.5	77	73.8-82.5	78	143.3-166.0
SCIII	52.8-74.8	64	45.4-55.0	50	98.2-129.8
Mag	53.3-75.3	64	29.7-41.7	36	83-117
Intersil	31.1-71.1	51	26-76	51	57.1-147.1
Jones Chemical	58.9-75.7	67	62.6-71.2	67	121.5-146.9
KTI	60.5-88.5	75	33.8-65.1	49	94.3-153.6
Lorentz	83-103	93	53.6-63.5	59	136.6-166.5
Mag Peripherals	42.4-74.4	58	32-62	47	74.4-136.4
Magnex	81.4-105.4	93	33.5-63.5	49	114.9-168.9
Memorex	62.7-78.2	71	41.1-83.5	62	103.8-161.7
Micrel (Adv LSI)	46.3-84.3	65	63-73	68	109.3-157.3
MMI SC	40.8-72.8	57	33.8-65.1	50	74.6-137.9
SV	53.9-60.9	57	60.7-73.7	67	114.6-134.6
Moffett NAS	28-46	37	56.9		84.9-102.9
Monsanto	59.7-81.7	71	29.5-72.5	51	89.2-154.2
NEC	50-78	64	59.9-69.5	65	109.9-147.5
NSC	52.7-82.7	68	52.5-72.5	63	105.2-155.2
Pac Nurs Pots	51.5-83.5	68	33-93	63	84.5-176.5
Pierce & Stevens	37-53	45	55.3-65.1	60	92.3-118.1
Precision Media	24.9-62.9	44	57-87	72	81.9-149.9
Precision Mono	59.2-77.2	68	64.5-73.5	69	123.7-150.7
Raytheon	62.5-77.5	70	79.7-88.5	84	142.2-166.0
Safety-Kleen	70.4-108.4	89	43.7-73.7	59	114.1-182.1
Siemens	72.6-96.8	85	64.6-74.5	70	137.2-171.3

TABLE IV - 6 OG con't

Facility	Site Score		Contaminant Score		Total
	Low-High	Avg	Low-High	Avg	Lows-Highs
Signetics 740	54.8-82.8	69	44.9-54.6	50	99.7-137.4
811	61.3-74.3	68	81.5-89.5	86	142.8-163.8
860	58.3-79.3	69	50.9-80.5	66	109.2-159.8
Siltec	54.5-82.5	69	63.2-73.0	68	117.7-155.5
Solvent Service	89.5-111.5	101	79.8-89.5	85	169.3-201.0
Spectra Physics	34.6-84.6	60	19-59	39	53.6-143.6
Stanford Cleaners	56.5-80.5	69	21.5-81.5	52	78-162
Synertek	47.1-65.1	56	59.5-69.0	64	106.6-134.1
Tandem(FourPhase)	61.7-79.7	71	59.6-69.5	65	121.3-149.2
Tech Coatings	57.4-85.4	71	60.8-83.5	72	118.2-168.9
Teledyne	67.6-76.8	72	59-67	63	126.6-143.8
Timex	60.5-94.0	77	61-81	71	121.5-175.0
TRW	55.7-73.7	65	81.9-89.5	86	137.6-163.2
UTC SV	50.9-71.5	61	47-76	62	97.9-147.5
Van Waters	65.3-83.3	74	81.6-93.0	87	146.9-176.3
Verbatim	61.5-81.5	72	50.1-70.0	60	111.6-151.5
Westinghouse	68.9-84.9	77	57.3-80.5	69	126.2-165.4
Xidex	61.5-81.5	72	61.1-81.0	71	122.6-162.5
Zymos	53.3-75.3	64	40.9-50.6	46	94.2-125.9

TABLE IV - 6

Numerical Scores For No Further Action (NA) Sites

Facility	Site Score		Contaminant Score		Total
	Low-High	Avg	Low-High	Avg	Lows-Highs
Amdahl	43.8-81.8	63	36.2-66.2	51	80-148
Applied Tech	51.3-71.3	61	54.2-76.0	65	105.5-147.3
Beckman	37.9-71.9	55	21.1-91.1	56	59-163
Bell Industries	26-65	46	35.2-58.7	47	61.2-123.7
Burke	66.5-95.5	81	39.0-62.5	51	105.5-158.0
Container Corp	50-90	70	39-59	49	89-149
DAP	58.6-98.6	79	33-73	53	91.6-171.6
Dysan 5301	36.6-64.6	51	42.1-62.1	52	78.7-126.7
Economics Lab	58.5-100.5	80	20-50	35	78.5-150.5
Harris Microwave	63-87	75	34-44	39	97-131
HP SJ	47.8-71.8	60	36.1-59.6	48	83.9-131.4
IMP	58.5-86.5	73	23.6-43.5	34	82.1-130.0
Kaiser Aluminum	20-22	21	22.1-42.1	32	42.1-64.1
LSI Logic	57.5-90.5	74	8.2-48.2	28	65.7-138.7
Qume	53-92	73	24.8-64.8	45	77.8-156.8
SafeWay Chemical	48.7-80.7	65	36.1-46.1	41	84.8-126.8
Scientific Gas	70.1-108.1	89	22.1-44.1	33	92.2-152.2
Sperry	49.9-77.9	64	36.0-65.5	51	85.9-143.4
U.S. Cellulose	72.5-104.5	89	22.3-44.2	33	94.8-148.7
Watkins Johnson	53.1-59.1	56	52.0-60.5	56	105.1-119.6
Zilog Bridge	30.4-80.4	55	22.2-62.2	42	52.6-142.6
Zilog Inc	30.4-80.4	55	31.6-63.1	47	62.0-143.5

TABLE IV - 6

Numerical Scores For No Contamination (NC) Sites

Facility	Site Score		Contaminant Score		Total
	Low-High	Avg	Low-High	Avg	Lows-Highs
Hi Line Paint	30.1-47.1	39	0		30.1-47.1
IBM S. 10th	52-76	64	0		52-76
Intersil	22.5-46.5	35	0		22.5-46.5
Owens	30.8-60.8	46	0		30.8-60.8
SJ Graphics	39.3-59.3	49	0		39.3-59.3
Sierra Chemical	9.7-39.7	25	0		9.7-39.7
STC Computer	25.3-55.3	40	0		25.3-55.3
Tandy	27.7-57.7	43	0		27.7-57.7
Toshiba	14.8-44.8	30	0		14.8-44.8

TABLE IV-7

NUMERICAL SITE RANKING

SITE NO.	SITE NAME	SCORE
68	SOLVENT SERVICE	185
11	IBM - 5600 COTTLE RD.	176
10	FAIRCHILD - SJ	163
41	VAN WATER & ROGERS	161
6	FAIRCHILD - MV	160
45	SIEMENS	154
7	INTEL - MV	154
8	RAYTHEON	154
2	SIGNETICS - 811 E. ARQUES	153
84	LORENTZ BARREL & DRUM	151
57	TRW	150
66	BECTON-DICKINSON	149
35	SAFETY-KLEEN	148
83	TIMEX	148
27	WESTINGHOUSE	145
1	AMD - 901	144
51	TECHNICAL COATINGS	143
67	FORD	143
99	FAIRCHILD - PA	143
55	XIDEX	142
61	MAGNEX	141
85	APPLIED MATERIALS	138
43	PRECISION MONO.	137
9	SILTEC	136
97	AYDIN	135
39	TANDEM (FOUR PHASE)	135
28	TELEDYNE	135
14	SIGNETICS - 860 KIFER	134
21	JONES CHEMICAL	134
75	MICREL (ADVANCED LSI)	133
15	MEMOREX - 1200 MEMOREX DR.	132
71	PACIFIC NURSERY	130
5	NATIONAL SEMI-CONDUCTOR	130
87	HEWLETT PACKARD - 974 E. ARQUES	129
53	AMI	129
90	AVANTEK	128
98	DURA BOND	128
29	NEC	128
26	HP-DEER CREEK	128
72	HP-CU	128
44	GREAT WESTERN	126
3	AMD - 915	125
23	FAIRCHILD - SC	124
24	HP-SV1501	124
4	MMI - SV	124
70	KTI	123
12	UTC - SV	122
86	AMPEX	122
36	MONSANTO	121
40	STANFORD CLEANERS	120

TABLE IV-7 (Continued)

NUMERICAL SITE RANKING

SITE NO.	SITE NAME	SCORE
49	SYNERTEK - 3050 & 3001	120
25	HP-640	119
13	SIGNETICS - 740 KIFER	118
69	PRECISION MEDIA	115
47	DATA GENERAL	114
17	INTEL - SC III	114
76	HP-MV	113
56	ZYMOS	110
18	DYSAN-5440	110
30	CIRCO	109
22	MMI - SC	106
88	MAGNETIC PERIPHERALS	105
58	EXAR-INTEGRATED	105
48	PIERCE & STEVENS	105
54	INTERSIL - SV	102
46	INPRINT	102
19	DYSAN-5200	102
16	INTEL - MAGNETICS	100
63	SPECTRA PHYSICS	98
62	MOFFETT NAS	93
38	VERBATIM	81

Note: The numerical scores are based on worst case data and do not include site mitigation measures.

TABLE IV-8

TOTAL NUMERICAL SCORE UNCERTAINTY

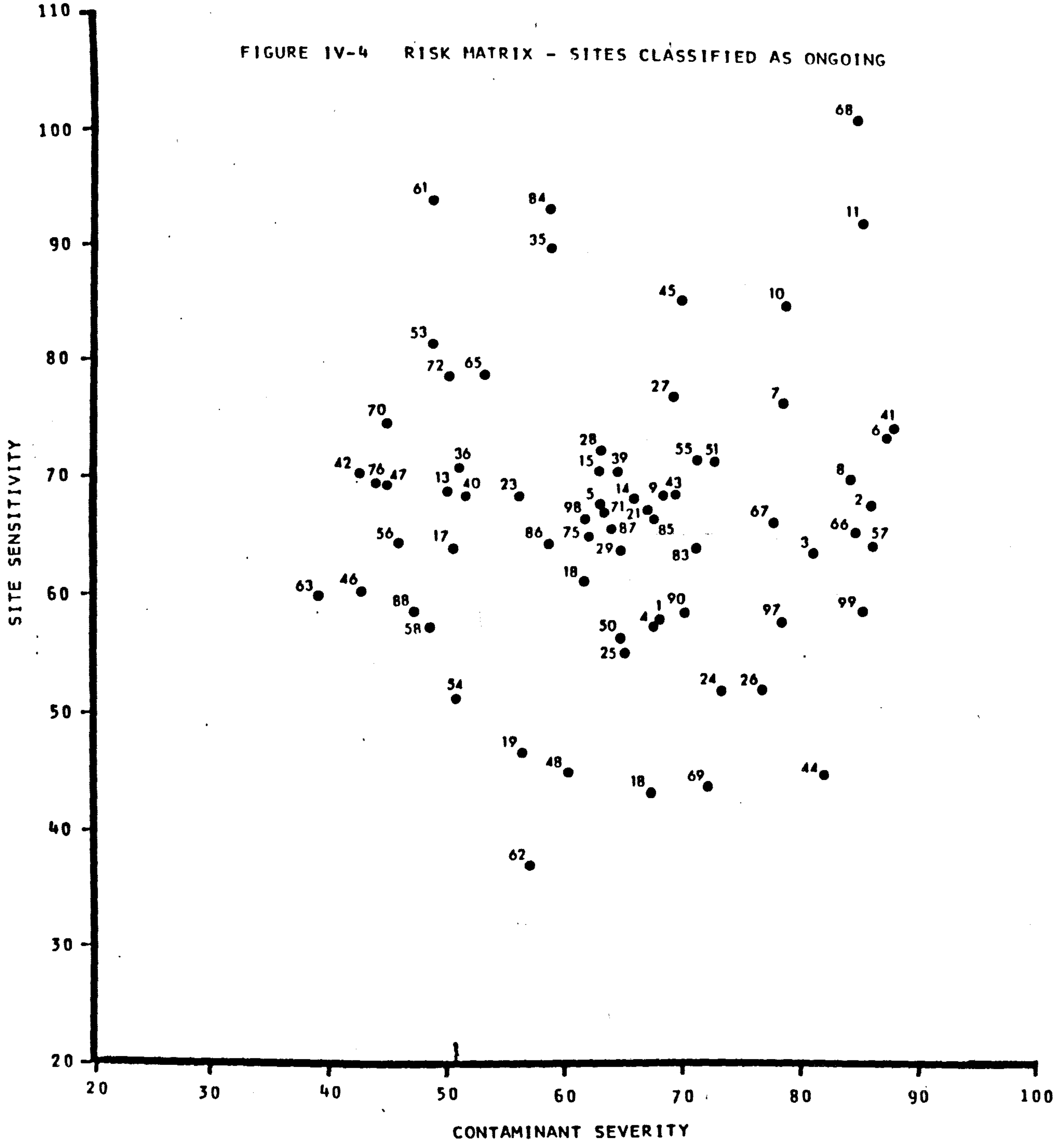
SITE NO.	SITE NAME	UNCERTAINTY
38	VERBATIM	~~39~~93.90
71	PACIFIC NURSERY	92.00
54	INTERSIL - SV	90.00
63	SPECTRA PHYSICS	90.00
40	Stanford Cleaners	84.00
90	AVANTEK	76.00
35	Safety-Kleen	68.00
69	PRECISION MEDIA	68.00
97	Aydin	65.50
36	MONSANTO	65.00
22	MMI - SC	63.30
88	MAGNETIC PERIPHERALS	62.00
87	HEWLETT PACKARD - 974 E. ARQUES	61.50
30	CIRCO	61.50
70	KTI	59.30
15	MEMOREX - 1200 MEMOREX DR.	57.90
61	Magnex	54.00
98	Dura Bond	53.70
83	Timex	53.50
51	TECHNICAL COATINGS	50.70
14	SIGNETICS - 860 KIFER	50.60
67	Ford	50.10
5	NATIONAL SEMI-CONDUCTOR	50.00
12	UTC - SV	49.60
46	InPrint	49.50
75	Micrel (Advanced LSI)	48.00
58	EXAR-INTEGRATED	48.00
85	APPLIED MATERIALS	42.70
55	XIDEX	39.90
86	AMPEX	39.80
27	WESTINGHOUSE	39.20
9	Siltec	37.80
13	SIGNETICS - 740 KIFER	37.70
29	NEC	37.60
45	Siemens	34.10
53	AMI	34.00
16	INTEL - MAGNETICS	34.00
68	SOLVENT SERVICE	31.70
47	DATA GENERAL	31.70
56	ZYMOS	31.70
17	INTEL - SC III	31.60
66	Becton-Dickinson	31.00
18	DYSAN-5440	30.00
84	LORENTZ BARREL & DRUM	29.90
23	FAIRCHILD - SC	29.50
41	VAN WATER & ROGERS	29.40
39	Tandem (Four Phase)	27.90
1	AMD - 901	27.60
3	AMD - 915	27.60
49	SYNERTEK - 3050 & 3001	27.50

TABLE IV-8 (Continued)

TOTAL NUMERICAL SCORE UNCERTAINTY

SITE NO.	SITE NAME	UNCERTAINTY
43	PRECISION MONO.	27.00
48	Pierce & Stevens	25.80
57	TRW	25.60
21	Jones Chemical	25.40
72	HP-CU	24.00
8	Raytheon	23.80
76	HP-MV	23.70
26	HP-Deer Creek	23.50
25	HP-640	23.50
99	Fairchild-PA	23.00
7	Intel-MV	22.70
44	Great Western	21.50
2	SIGNETICS - 811 E. ARQUES	21.00
24	HP-SV1501	20.00
4	MMI - SV	20.00
19	DYSAN-5200	20.00
11	IBM - 5600 COTTLE RD.	18.50
10	FAIRCHILD - SJ	18.50
62	Moffett NAS	18.00
28	Teledyne	17.20
6	Fairchild -MV	16.00

FIGURE IV-4 RISK MATRIX - SITES CLASSIFIED AS ONGOING



sites without showing the uncertainty. Six show the on-going sites in each of the cities with the uncertainty depicted, one for sites where no further Regional Board action is required (i.e., NA), and one for sites where no contamination was found (i.e., NC).

The mean values of the scores shown in Table IV-6 were plotted for the on-going sites resulting in Figure IV-4. As shown, the highest degree of risk results from a large spill of toxic chemicals in a permeable aquifer that is supplying drinking water (upper right-hand corner). In contrast, the lowest degree of risk would result from a small spill of toxic chemicals where thick clays and no aquifer occurs (lower left-hand corner). As shown in Figures IV-5 through IV-11 the level of uncertainty is depicted by plotting a line representing a range in site sensitivity and contaminant values.

Review of these figures indicates that the majority of sites in the upper right hand corner of the risk matrix are in the city of San Jose. As previously noted, sites in the upper right hand corner present the highest degree of risk.

Review of Figure IV-11 indicates that the NA sites , where data is available, cluster in the lower left hand corner of the risk matrix indicating a low degree of risk and that the assignment to the NA classification by the Regional Board staff appears reasonable. Please note that these sites were plotted using the lowest scale scores and not the average scale scores as were the sites classified as on-going. This was the case since it was felt by the project staff that these sites should not be penalized with uncertainty because of past decisions that had made by the Regional Board staff.

DATA UNCERTAINTY

As discussed previously, 24 scales were used within the assessment methodology to score and rank the sites with soil and groundwater pollution. In general, the data required to use these scales can be grouped into the following three areas: 1) information on basin hydrogeology, 2) information on the physical properties and toxicity of the contaminants found, and 3) information on the magnitude of contamination. In order to summarize the general level of uncertainty associated with the data used to score the sites and identify data gaps and areas where additional work may be necessary Table IV- 9 was developed.

Review of Table IV-9 indicates that, in general, data on the basin hydrogeology and contaminant properties is adequate, and an absolute score on those scales can be assigned. However, there is a significant degree of uncertainty associated with those scales used to assess the magnitude of contamination , and the barriers to contaminant migration at a site. This finding is consistent with those made relative to plume identification for the various sites.

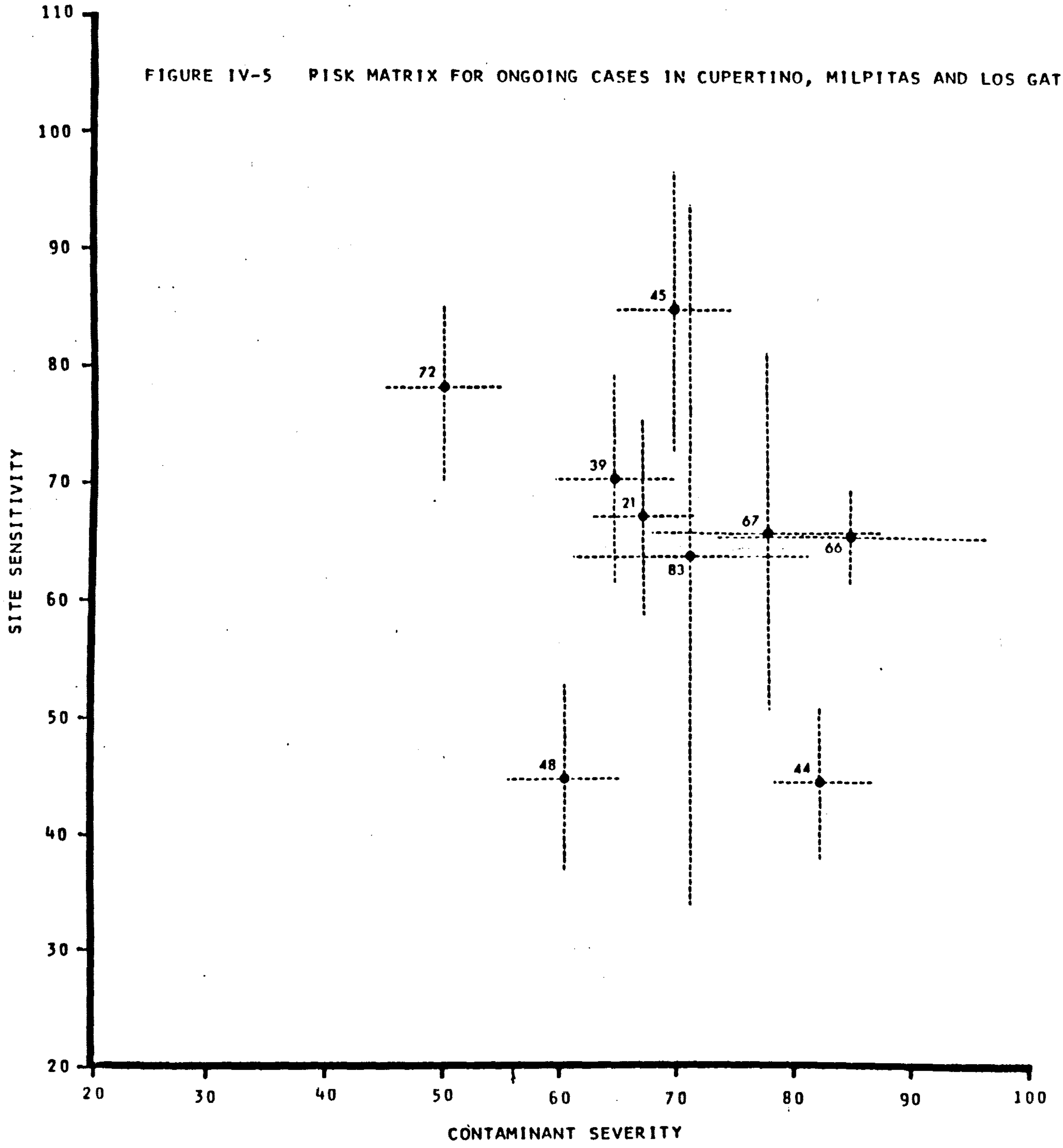


FIGURE IV-5 RISK MATRIX FOR ONGOING CASES IN CUPERTINO, MILPITAS AND LOS GATOS

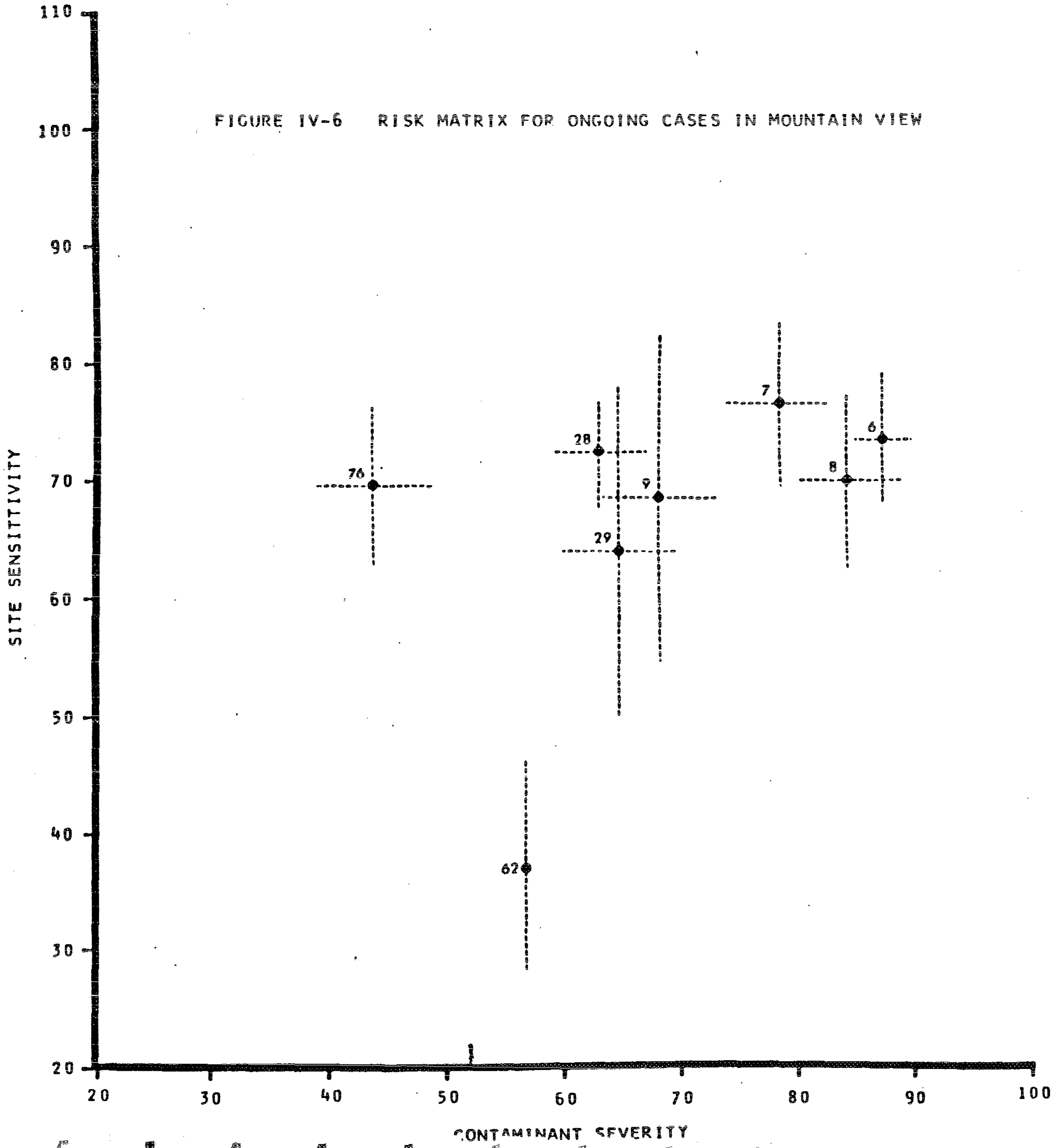
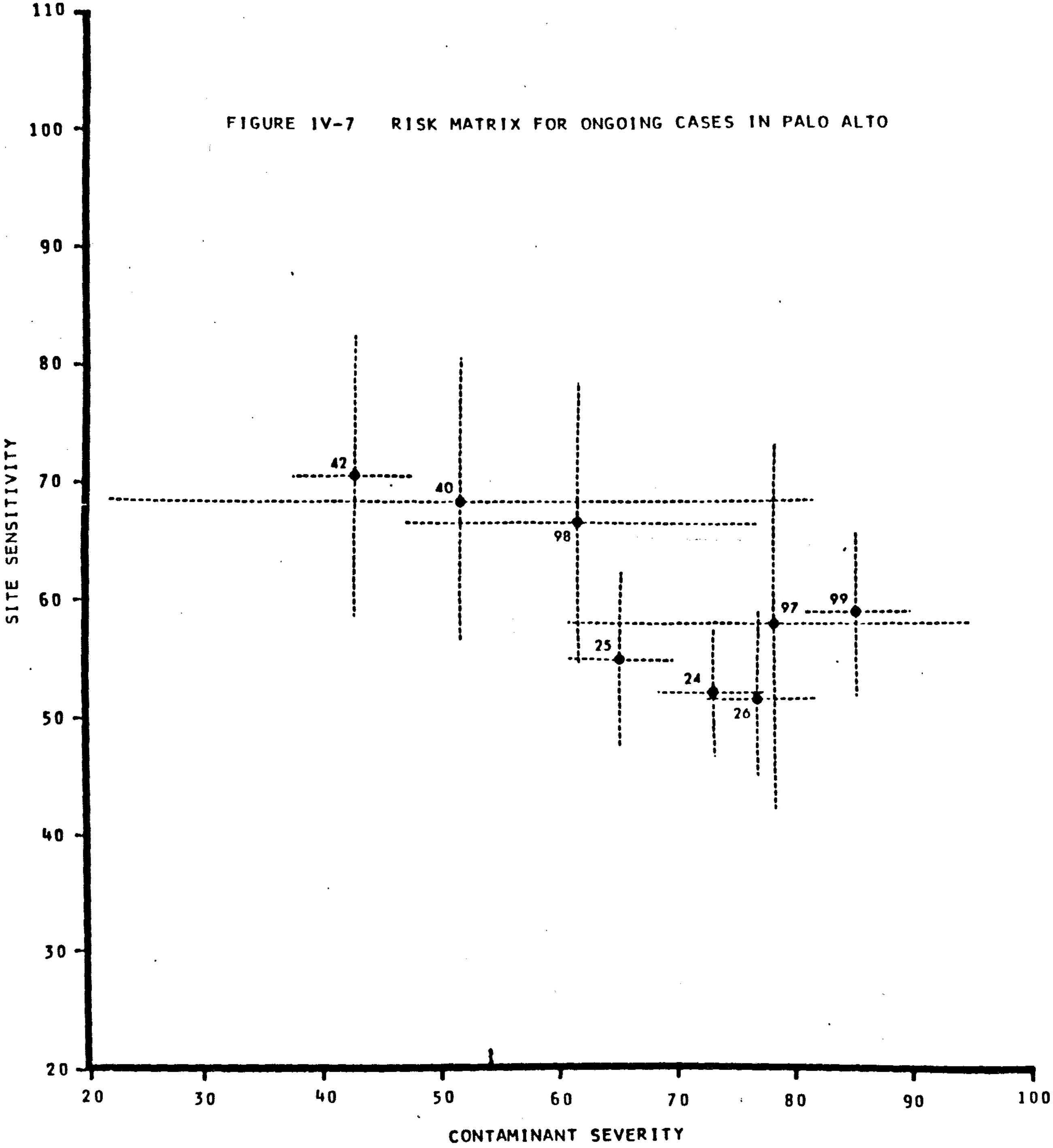


FIGURE IV-6 RISK MATRIX FOR ONGOING CASES IN MOUNTAIN VIEW

FIGURE IV-7 RISK MATRIX FOR ONGOING CASES IN PALO ALTO



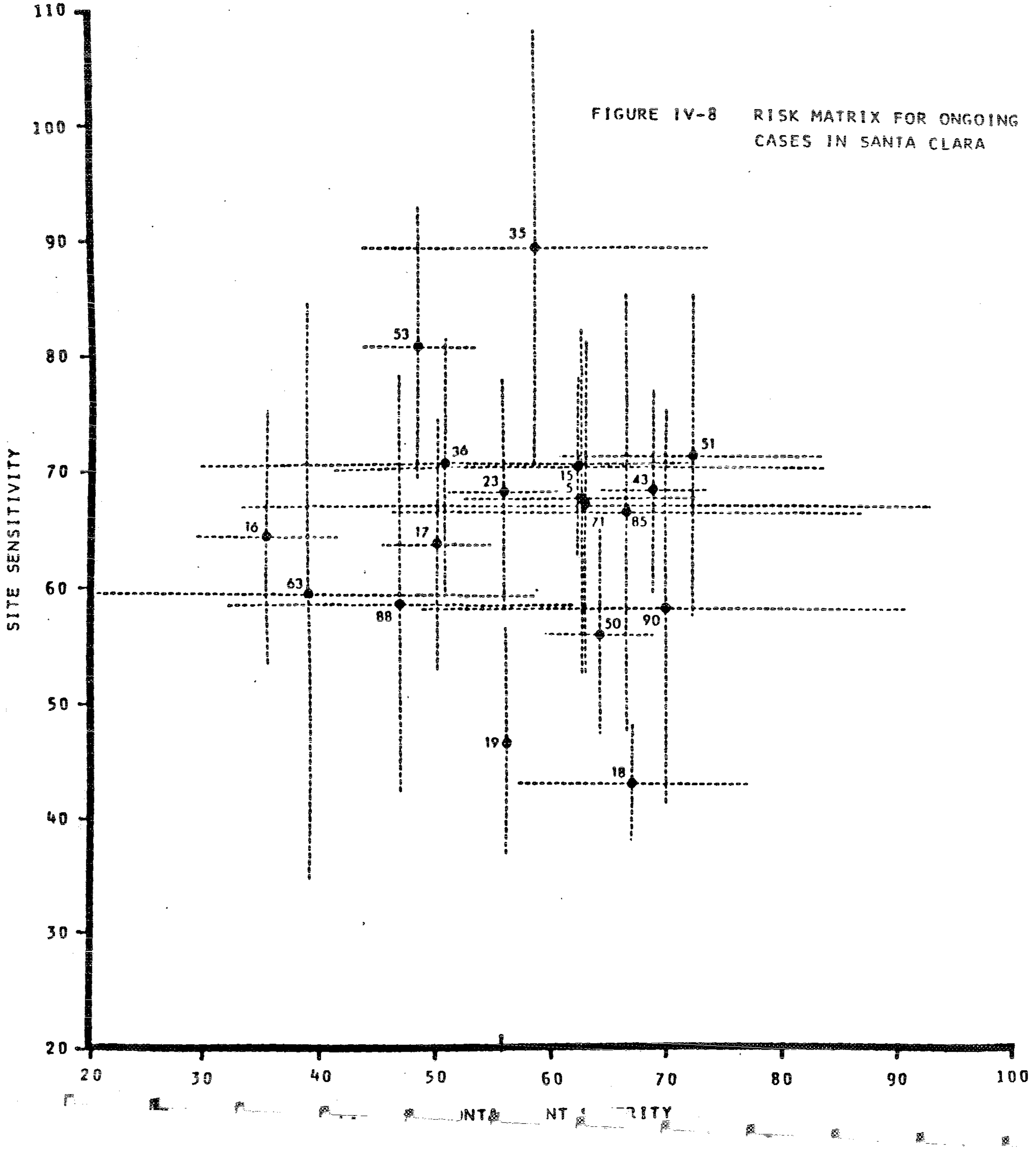


FIGURE IV-8 RISK MATRIX FOR ONGOING CASES IN SANTA CLARA

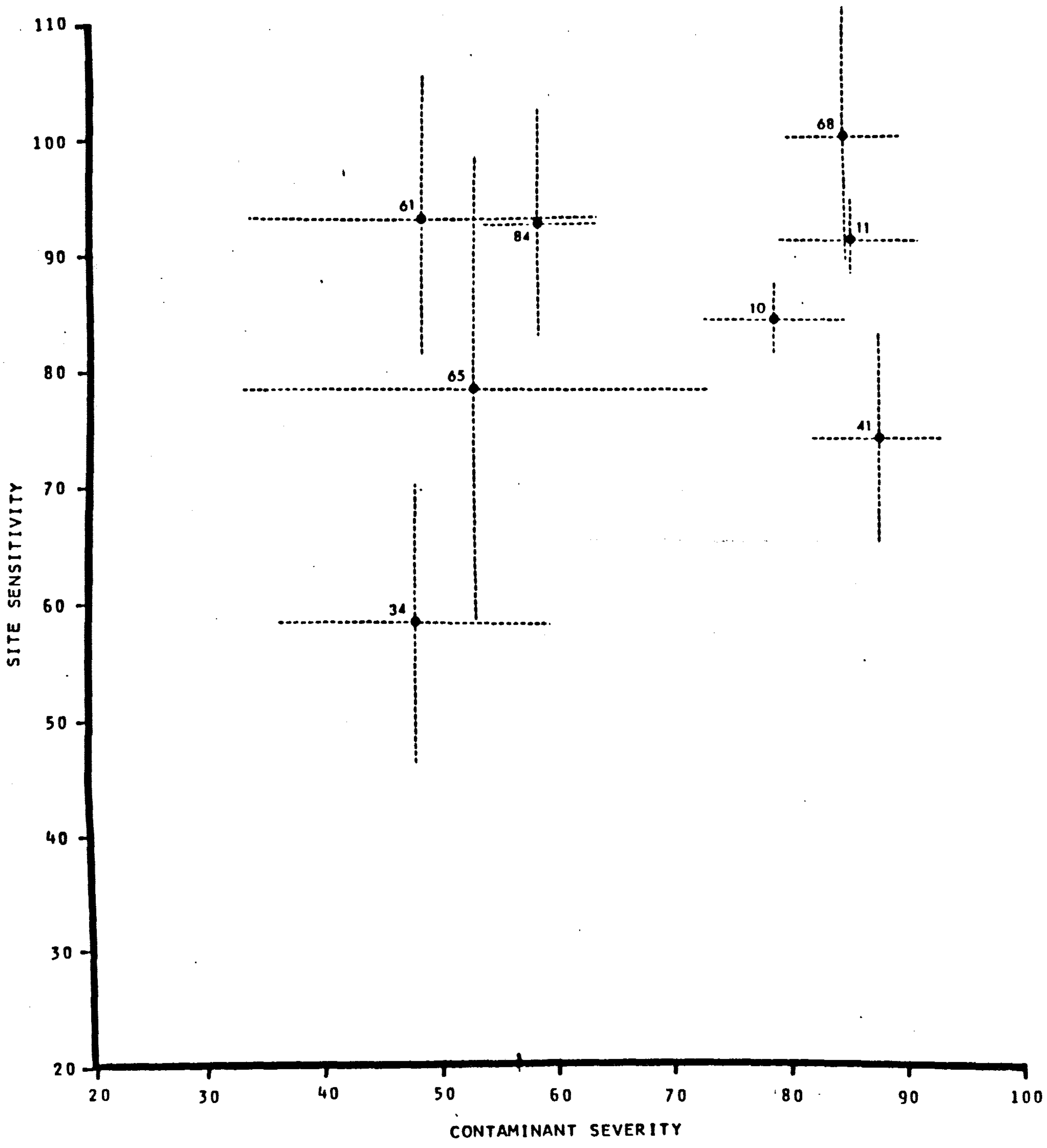


FIGURE IV-9 RISK MATRIX FOR ONGOING CASES IN SAN JOSE

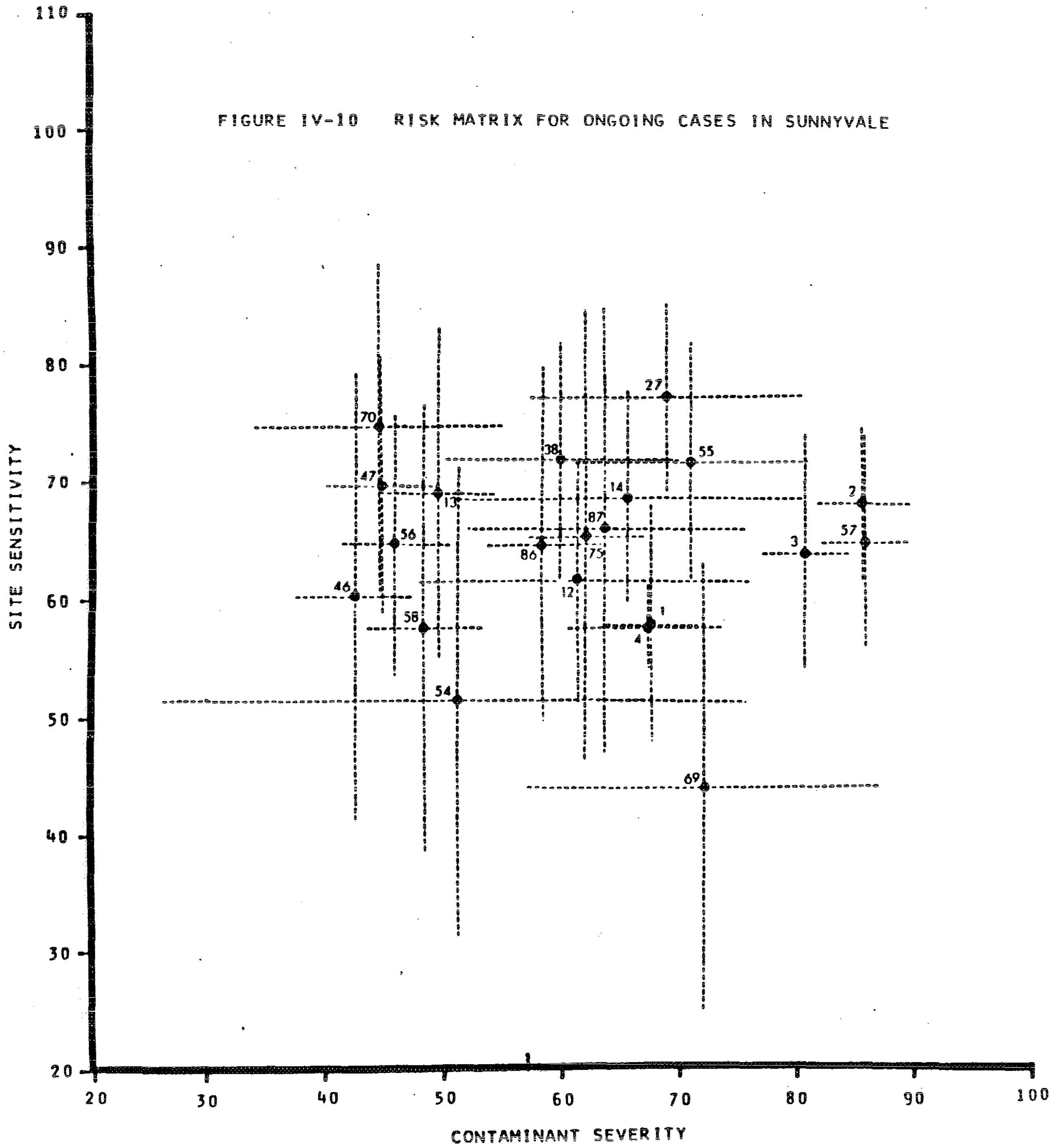


FIGURE IV-10 RISK MATRIX FOR ONGOING CASES IN SUNNYVALE

TABLE IV-9 DATA UNCERTAINTY - ON GOING (OG) SITES

FACILITIES	SITE SENSITIVITY FACTORS														CONTAMINANT SEVERITY FACTORS									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(14a)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
CUPERTINO																								
HP	++	++	++	++	++	++	++	++	++	++	+	-	-	++	++	++	++	++	++	++	++	++	-	++
Siemens	++	++	++	++	++	++	++	++	+	+	+	-	-	-	++	++	++	++	++	++	++	++	+	++
Tandem(Four Phase)	++	++	++	++	++	++	++	++	++	++	+	+	+	-	++	++	++	++	++	++	++	++	+	++
Timex	++	++	++	++	++	++	++	+	++	++	-	-	-	-	++	++	++	++	++	++	-	++	-	++
LOS GATOS																								
Becton-Dickinson	++	++	++	++	++	++	++	++	++	++	+	+	-	++	++	++	++	++	+	+	++	++	+	++
MILPITAS																								
Ford	++	++	++	++	++	++	++	++	+	+	+	-	-	-	++	++	++	++	+	+	++	++	+	++
Great Western	++	++	++	++	++	++	++	++	+	+	+	+	-	++	++	++	++	++	++	++	++	++	+	++
Jones	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	++	++	++	++	++	++	+	++
Pierce & Stevens	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	++	++	++	++	++	++	+	++
MOUNTAIN VIEW																								
Fairchild	++	++	++	++	++	++	++	++	++	++	+	+	-	++	++	++	++	++	++	++	++	++	+	++
HP	++	++	++	++	++	++	++	++	+	++	+	-	-	++	++	++	++	++	++	++	++	++	+	++
Intel	++	++	++	++	++	++	++	++	++	++	+	-	-	++	++	++	++	++	++	++	++	++	+	++
Moffett NAS	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	++	++	++	++	++	++	++	++
NEC	++	++	++	++	++	++	++	++	+	+	+	-	-	-	++	++	++	++	++	++	++	++	+	++
Raytheon	++	++	++	++	++	++	++	++	+	+	+	+	-	++	++	++	++	++	++	++	++	++	+	++
Siltec	++	++	++	++	++	++	++	++	+	+	+	-	-	-	++	++	++	++	++	++	++	++	+	++
Teledyne	++	++	++	++	++	++	++	++	+	++	+	++	-	++	++	++	++	++	++	++	++	++	+	++
PALO ALTO																								
Aydin	++	++	++	++	++	++	++	+	++	++	-	-	-	-	++	++	++	++	++	+	-	++	-	++
Dura-Bond	++	++	++	++	++	++	++	++	++	++	+	-	-	-	++	++	++	++	++	++	++	-	+	++
Fairchild	++	++	++	++	++	++	++	++	++	++	+	-	-	++	++	++	++	++	++	++	++	++	+	++
HP Deer Cr	++	++	++	++	++	++	++	++	++	++	+	-	-	++	++	++	++	++	++	++	++	++	+	++
395 PM	++	++	++	++	++	++	++	++	++	++	+	-	-	-	++	++	++	++	++	++	++	++	-	++
640 PM	++	++	++	++	++	++	++	++	++	++	+	-	-	++	++	++	++	++	++	++	++	++	+	++
1501 PM	++	++	++	++	++	++	++	++	++	++	+	+	-	++	++	++	++	++	++	++	++	++	+	++
Stanford Cleaners	++	++	++	++	++	++	++	++	++	++	+	-	-	-	++	-	-	-	-	-	++	++	-	++

LEGEND: ++ = Complete Information + = Some Information - = No Information

TABLE IV-9 DATA UNCERTAINTY - ON GOING (OG) SITES

SITE SENSITIVITY FACTORS

CONTAMINANT SEVERITY FACTORS

FACILITIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(14a)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
SAN JOŠE																								
Fairchild	++	++	++	++	++	++	++	++	++	++	+	+	+	++	++	++	-	++	+	+	++	++	++	++
IBM Cottle Rd	++	++	++	++	++	++	++	++	++	++	+	+	+	++	++	++	-	++	+	+	++	++	++	++
Lorentz	++	++	++	++	++	++	++	++	+	+	++	-	-	++	++	++	++	++	++	++	++	++	+	++
Magnex	++	++	++	++	++	++	++	++	++	++	+	-	-	-	++	++	-	-	++	++	++	++	-	++
Solvent Service	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	++	++	++	++	++	++	+	++
UTC	-	-	-	-	-	-	-	++	-	-	+	-	-	+		++	++	++	++	++	++	-	-	++
Van Waters	++	++	++	++	++	++	++	++	+	++	+	-	-	++	++	++	++	++	+	++	++	++	+	++
SANTA CLARA																								
AMI	++	++	++	++	++	++	++	++	++	++	+	-	-	-	++	++	++	++	++	++	++	++	+	++
Applied Materials	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	-	++	+	+	++	++	+	++
Avantek	++	++	++	++	++	++	++	++	+	+	+	-	-	-	++	++	-	++	+	+	++	-	-	++
Dysan 5200	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	++	++	++	++	++	++	++	++
5440	++	++	++	++	++	++	++	++	+	+	+	++	++	++	++	++	-	-	++	++	++	++	++	++
Fairchild	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	++	++	++	++	++	++	+	++
Intel SCIII	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	++	++	++	++	++	++	+	++
Magnetics	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	-	++	+	+	++	++	++	++
MMI	++	++	++	++	++	++	++	++	+	+	+	-	-	-	++	++	++	++	+	+	++	-	+	++
Mag Peripherals	++	++	++	++	++	++	++	++	+	+	+	-	-	-	++	-	-	-	++	++	++	++	++	++
Memorex	++	++	++	++	++	++	++	++	+	+	+	+	-	++	++	++	-	++	+	+	++	-	+	++
Monsanto	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	-	++	+	+	++	-	-	++
NSC	++	++	++	++	++	++	++	++	+	+	+	-	-	-	++	++	-	++	+	+	++	++	+	++
Pac Nurs Pots	++	++	++	++	++	++	++	++	+	+	+	-	-	-	++	-	-	-	-	-	++	++	+	++
Precision Mono	++	++	++	++	++	++	++	++	+	++	+	-	-	++	++	++	++	++	++	++	++	++	+	++
Safety-Kleen	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	++	++	++	++	++	-	-	++
Spectra Physics	++	++	++	++	++	++	++	-	+	+	-	-	-	-	++	++	-	++	++	++	-	++	-	++
Synertek	++	++	++	++	++	++	++	++	+	+	++	-	-	++	++	++	++	++	++	++	++	++	+	++
Tech Coatings	++	++	++	++	++	++	++	++	+	+	-	-	-	++	++	++	-	++	+	+	++	++	+	++
SUNNYVALE																								
AMD 901	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	++	++	++	++	++	++	+	++
915	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	++	++	++	++	++	++	+	++
Ampex	++	++	++	++	++	++	++	++	+	+	-	-	-	+	++	++	++	++	++	++	++	++	+	++

LEGEND: ++ = Complete Information + = Some Information - = No Information

TABLE IV-9 DATA UNCERTAINTY - ON GOING (OG) SITES

FACILITIES	SITE SENSITIVITY FACTORS																CONTAMINANT SEVERITY FACTORS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(14a)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
SUNNYVALE con't																								
Circo	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	++	++	+	+	++	++	-	++
Data General	++	++	++	++	++	++	++	++	+	+	+	-	-	+	++	++	++	++	++	++	++	++	+	++
Exar-Integrated	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	++	++	++	++	++	++	-	++
HP	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	++	++	+	+	++	++	-	++
InPrint	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	++	++	+	+	++	++	-	++
Intersil	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	-	-	++	++	++	-	-	++
KTI	++	++	++	++	++	++	++	++	+	+	-	-	-	++	++	++	++	++	+	+	++	-	+	++
Micrel (Adv LSI)	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	++	++	++	++	++	++	-	++
MMI	++	++	++	++	++	++	++	++	+	+	++	++	-	++	++	++	-	++	+	+	++	++	++	++
Precision Media	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	-	-	++	++	++	++	-	++
Signetics 740	++	++	++	++	++	++	++	++	+	+	+	-	-	-	++	++	++	++	++	++	++	++	+	++
811	++	++	++	++	++	++	++	++	+	+	+	+	-	++	++	++	++	++	++	++	++	++	+	++
860	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	++	++	++	++	++	-	+	++
TRW	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	++	++	++	++	++	++	+	++
UTC	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	-	-	++	++	++	++	+	++
Verbatim	++	++	++	++	++	++	++	++	+	+	+	-	-	+	++	++	-	++	++	++	++	++	+	++
Westinghouse	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	++	-	++	+	++	++	+	++
Xidex	++	++	++	++	++	++	++	++	+	+	+	-	-	+	++	++	-	++	++	++	++	++	+	++
Zymos	++	++	++	++	++	++	++	++	+	+	+	-	-	+	++	++	++	++	++	++	++	++	+	++

LEGEND: ++ = Complete Information + = Some Information - = No Information

TABLE IV-9 DATA UNCERTAINTY - NO FURTHER ACTION (NA) SITES

FACILITIES	SITE SENSITIVITY FACTORS															CONTAMINANT SEVERITY FACTORS								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(14a)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
CUPERTINO																								
Kaiser Aluminum	++	++	++	++	++	++	++	++	++	++	+	++	++	++	++	++	-	++	++	++	++	++	-	++
Zilog Bridge	++	++	++	++	++	++	++	-	-	-	++	-	-	-	++	++	++	++	+	+	-	++	-	++
Inc	++	++	++	++	++	++	++	-	-	-	++	-	-	-	++	++	++	++	+	+	-	++	-	++
MILPITAS																								
Harris Microwave	++	++	++	++	++	++	++	++	+	+	+	-	-	+	++	++	++	++	++	++	++	++	-	++
LSI Logic	++	++	++	++	++	++	++	++	+	+	+	-	-	-	++	-	-	-	++	++	++	++	-	++
PALO ALTO																								
Beckman	++	++	++	++	++	++	++	+	++	++	-	-	-	-	++	-	-	-	-	-	-	++	++	++
Watkins Johnson	++	++	++	++	++	++	++	++	++	++	+	+	+	++	++	++	++	++	++	++	++	++	+	++
SAN JOSE																								
Burke	++	++	++	++	++	++	++	++	+	+	++	-	-	-	++	++	++	++	+	+	++	++	-	++
DAP	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	-	++	++	++	++	-	-	++
Economics Lab	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	-	-	++	++	++	++	-	++
HP	++	++	++	++	++	++	++	++	++	++	+	-	-	-	++	++	++	++	+	+	++	++	-	++
IMP	++	++	++	++	++	++	++	++	+	+	++	-	-	-	++	++	-	++	++	++	++	++	+	++
Qume	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	-	++	++	++	-	++	-	++
Safe-Way Chemical	++	++	++	++	++	++	++	++	+	+	+	-	-	-	++	++	++	++	++	++	++	++	-	++
U.S. Cellulose	++	++	++	++	++	++	++	++	+	+	+	-	-	-	++	++	-	++	+	+	++	++	+	++
SANTA CLARA																								
Container Corp	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	-	++	++	++	++	++	-	++
Dysan 5301	++	++	++	++	++	++	++	++	+	+	-	-	-	++	++	++	++	++	++	++	++	-	++	++
Scientific Gas	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	-	++	+	+	++	++	-	++
Sperry Univac	++	++	++	++	++	++	++	++	+	+	-	-	-	++	++	++	++	++	++	++	++	-	+	++
SUNNYVALE																								
Amdahl	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	++	++	++	++	++	-	-	++
Applied Tech	++	++	++	++	++	++	++	++	+	+	+	-	-	++	++	++	-	++	+	+	++	++	+	++
Bell Industries	++	++	++	++	++	++	++	++	+	+	-	-	-	-	++	++	++	++	+	+	++	++	-	++

LEGEND: ++ = Complete Information + = Some Information - = No Information

TABLE IV-9 DATA UNCERTAINTY - NO CONTAMINATION (NC) SITES

FACILITIES	SITE SENSITIVITY FACTORS															CONTAMINANT SEVERITY FACTORS								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(14a)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
CAMPBELL																								
Hi Line Paint	++	++	++	++	++	++	++	++	++	++	+	-	-	+	++									
CUPERTINO																								
Intersil	++	++	++	++	++	++	++	++	++	++	+	-	-	-	++									
MILPITAS																								
Sierra Chemical	++	++	++	++	++	++	++	++	++	++	-	-	-	-	++									
SAN JOSE																								
IBM S.10th St	++	++	++	++	++	++	++	++	++	++	+	-	-	-	++									
San Jose Graphics	++	++	++	++	++	++	++	++	++	++	++	-	-	-	++									
SANTA CLARA																								
Owens Corning	++	++	++	++	++	++	++	++	++	++	-	-	-	-	++									
STC Computer	++	++	++	++	++	++	++	++	++	++	-	-	-	-	++									
Tandy	++	++	++	++	++	++	++	++	++	++	-	-	-	-	++									
SUNNYVALE																								
Toshiba	++	++	++	++	++	++	++	++	++	++	-	-	-	-	++									

LEGEND: ++ = Complete Information + = Some Information - = No Information

V. RISK MANAGEMENT

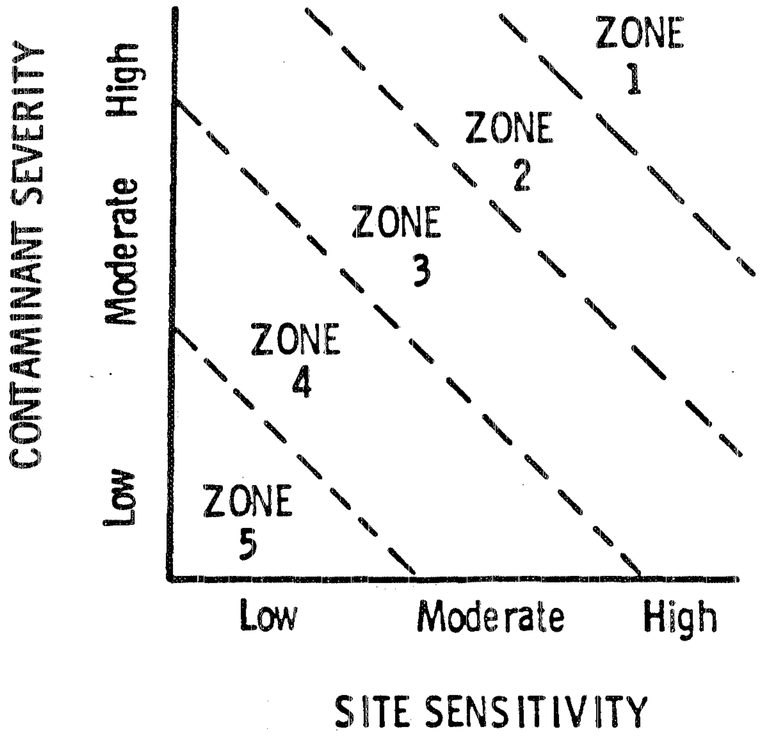
The National Academy of sciences has defined the term risk management as the complex of judgment and analysis that uses the results of risk assessment to produce a decision about environmental action. Within this context, this section has two purposes: 1) to define zones of risk or degree of problem seriousness, and 2) to identify areas within the subbasin which are sensitive to groundwater pollution.

ZONES OF RISK (DEGREE OF PROBLEM SERIOUSNESS)

If the number of potential problem sites is very large in comparison to the number which can realistically be dealt with, then some rational method of choosing which sites should be dealt with first is indispensible. The risk assessment methodology presented within this report was developed with this type of application in mind. However, in order to utilize the results of this work it is necessary to define zones of risk which correspond to the degree of problem seriousness. This concept was briefly discussed in Section II and is shown in Figure V-1.

The first zones of risk that appear reasonable to define are those which distinguish between sites which the Regional Board would and would not require additional site investigation and clean-up. In order to define these zones, the results of the previous site rankings will be utilized. As previously discussed, some 72 sites were rated and ranked using the assessment methodology. These sites include those where groundwater has been polluted resulting in the closure of water supply wells. These sites also include those that were screened out, by the Board's staff, as not having to undertake any additional work at the present time because the site did not represent an immediate threat to groundwater.

Figure V-2 is a plot of the site ratings for those sites that were required to take further action relative to identifying the extent of contamination and clean-up. Sites that were screened out are not included on this plot, but would fall into the lower left hand corner of the plot as shown in Figure V-2. If a line is drawn below those sites where additional work was required, the line, as shown in Figure V-3, would go from 80 to 80 on each of the scales. This line could then be used to define the zone below which the Board generally would not require additional investigation and clean-up and above which the Board would require additional work. In instances where a site might overlap a number of zones due to a high degree of uncertainty, knowledge of the specific factors responsible for the uncertainty can be further be investigated and the uncertainty hopefully reduced. We propose that these zones be used by the Regional Board to make future decisions relative to the screening of new sites.



RISK POTENTIAL MATRIX

FIGURE V-1

ZONE 1 = HIGH RISK
ZONE 5 = LOW RISK

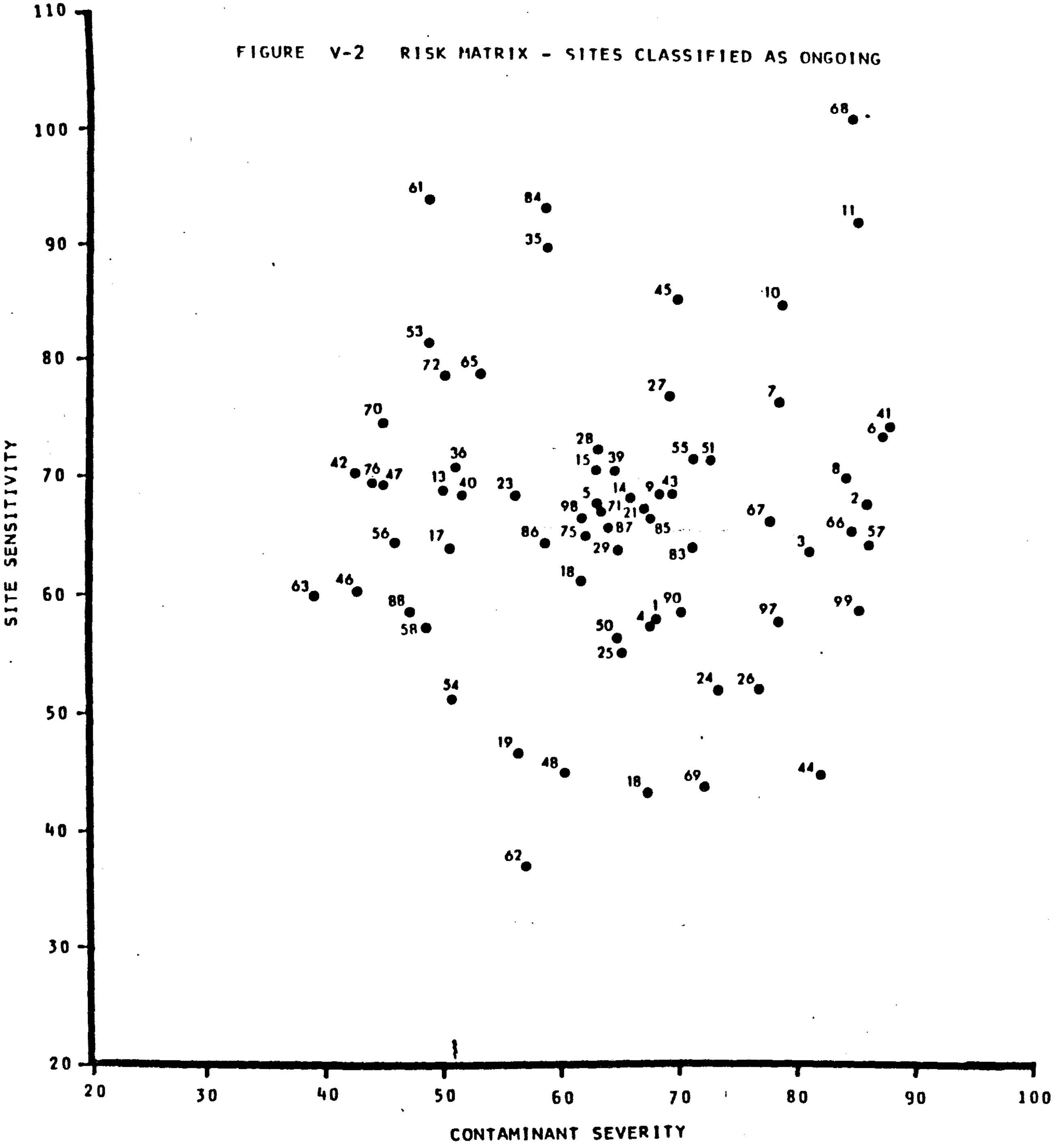
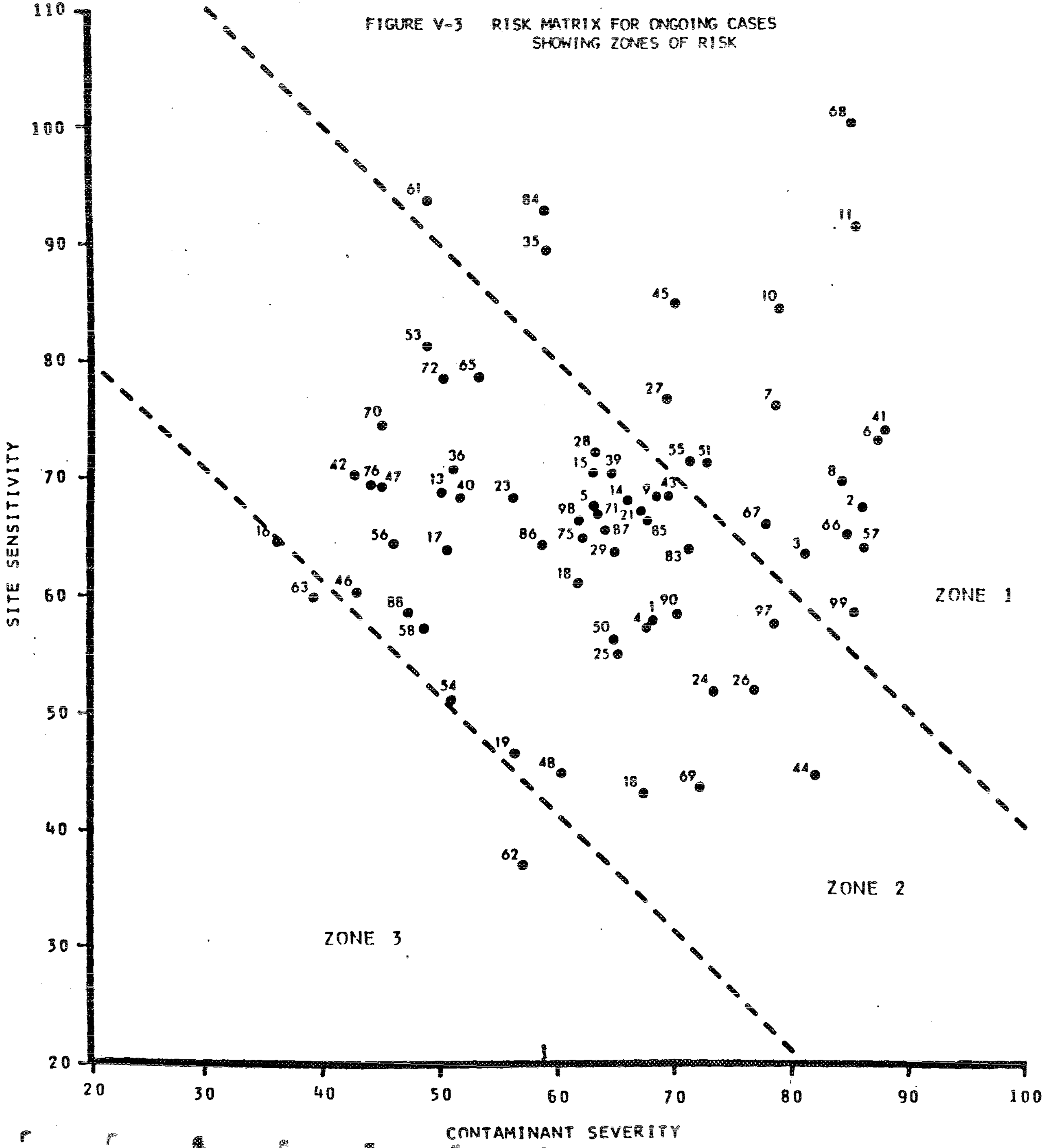


FIGURE V-2 RISK MATRIX - SITES CLASSIFIED AS ONGOING

FIGURE V-3 RISK MATRIX FOR ONGOING CASES
SHOWING ZONES OF RISK



Beyond just identifying those sites where some further action is nescessary, the setting of priorities is an end to which the risk matrix shown in Figure V-3 lends itself. The setting of priorities is important in order to insure that a regulatory agency is directing its efforts at the sites with the highest risk or degree of problem seriousness. It is also important since regulatory action has not generally been set by following a systematic approach. It would be a tremendous advantage to the operation of regulatory agencies and the reduction of risk if the agency could make the case that its prioritization was consistent, reproduceable, and technically valid.

Three zones of risk have been defined as shown in Figure V-3. These zones are defined as follows:

1-HIGH: large extent of pollution, very sensitive area of the basin, and relatively high potential to impact public health,

2-MODERATE: moderate extent of pollution, moderately sensitive area of the basin, moderate potential to impact public health, and

3-LOW: small extent of pollution, not a sensitive area of the basin, and slight potential to impact public health.

These zones are arbitrarily defined, but they reasonably represent the degree of seriousness associated with a site and they are reasonably consistent with past regulatory decisions made by the Regional Board.

The value of the assessment methodology and use of the zones of risk, as a means by which to gauge the question "HOW BAD IS BAD?" hinges upon the early evaluation of a site. This is particulary important in instances where a site might have a high degree of uncertainty and knowledge of specific factors responsible for this uncertainty could be further investigated and the uncertainty reduced.

Although subjective, the assessment methodology permits, as shown, a consistent rating and ranking of sites with an indication of degree of uncertainty involved, and it allows for modification of the rating and rank of any site should additional data become available.

It should be noted that a reasonably conscientious effort must be made to apply the methodology carefully so that the relative ranking of sites is internally consistent. Additionally, it should also be noted that the assessment methodology and zones of risk should serve as an aid to decision makers but cannot and should not ever replace them or their judgment in making decisions.

BASIN SENSITIVITY

The term "basin sensitivity" is used to indicate the likelihood of, and degree to which groundwater resources may be polluted at a particular location within a groundwater basin. Implicit within this description is the areal extent and potential or existing importance of the groundwater resource.

Figure V-4 is a sensitivity map of the basin and was constructed from the data compiled in this report. To do this, six parameters were used as a measurement of the sensitivity of different locations in the Santa Clara Valley groundwater subbasin to groundwater pollution. These parameters include: 1) the number and location of municipal wells (Figure III-6), 2) the number and distribution of private wells (Figure III-7), 3) well production on a section basis (Figure III-9), 4) the number and distribution of conduits allowing for potential migration of contaminants (i.e., inactive, active, and destroyed wells, Figure V-8, 5) the areal geology of the subbasin (Figure III-16), and 6) the hydrogeologic features of the subbasin (Figure III-11).

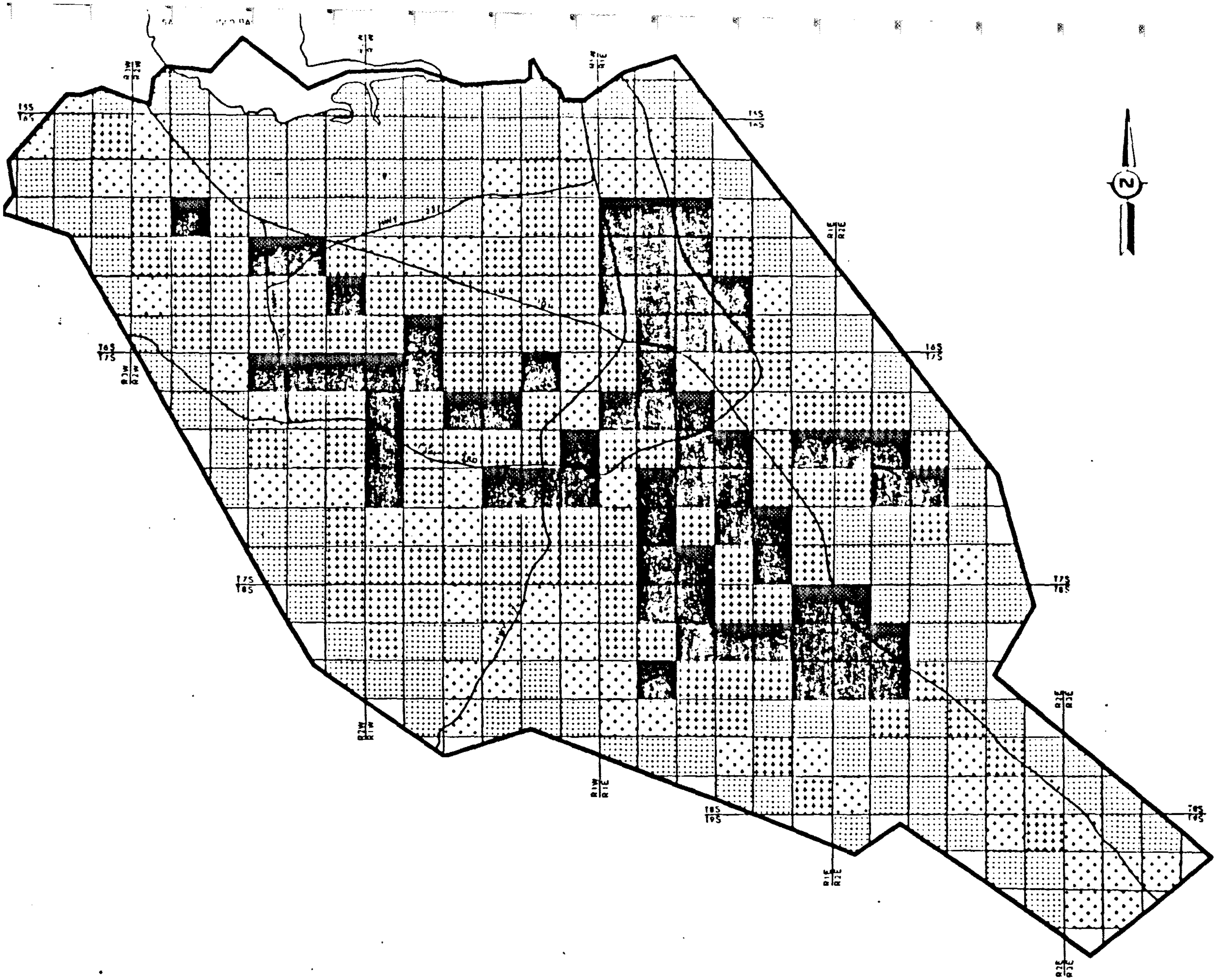
In order to look at the subbasin on a meaningful scale, the valley was divided into one square-mile sections consistent with the United States Geologic Survey's township and range grid system. Next, scales representing sensitivity to groundwater pollution for the six parameters identified above were developed. A discussion of each follows.

The first two scales, municipal and private well density, are shown in Figures V-5 and V-6. Both of these scales act as a measure of the degree of exposure.

Similarly, the well production scale, as shown in Figure V-7 addresses the probability of contaminants being pumped to the surface where exposure can occur. In addition, it also incorporates the threat of contaminant transport from groundwater pumpage in each section.

The scale shown in Figure V-8 together with Figure III-8 incorporate all known information on the number and location of active, inactive, and destroyed wells within the subbasin. This scale is used as a measure of possible contaminant transport due to interconnection between different water-bearing zones.

The last two scales relate to features of the groundwater basin and how these features affect contaminant migration. The first of these scales, as shown in Figure V-8, considers areal geology. This scale, as shown below, addresses the type of geologic material present in a specific section of the groundwater basin and the relative differences in permeabilities that can influence groundwater flow. Using areal geology is somewhat crude and imprecise when considering contaminant flow, however, we believe it is acceptable when used to address overall basin recharge and water movement, on a relative basis.



L E G E N D

░	LOW SENSITIVITY (LESS THAN 30 POINTS)
⁘	MEDIUM-LOW SENSITIVITY (31-40 POINTS)
▦	MEDIUM-HIGH SENSITIVITY (41-50 POINTS)
■	HIGH SENSITIVITY (GREATER THAN 50 POINTS)

LOW SENSITIVITY: AN AQUIFER OF MODERATELY LOW PERMEABILITY, OR AREA OF SALT WATER INTRUSION, OR NON-WATER BEARING BASIN FRINGE AREA, AND VERY SMALL NUMBER OF WELLS, AND SLIGHT IMPORTANCE AS A DRINKING WATER SOURCE.

MEDIUM-LOW SENSITIVITY: AN AQUIFER OF VARIABLE PERMEABILITY, AND SMALL NUMBER OF WELLS, AND IS OR CAN BE AN IMPORTANT DRINKING WATER SOURCE.

MEDIUM-HIGH SENSITIVITY: A MODERATELY PERMEABLE AQUIFER, AND MODERATE NUMBER OF WELLS, AND IS AN IMPORTANT DRINKING WATER SOURCE.

HIGH SENSITIVITY: A VERY PERMEABLE AQUIFER, AND EXPOSED AT THE SURFACE, AND LARGE NUMBER OF WELLS, AND IS AN IMPORTANT DRINKING WATER SOURCE.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
AND
SANTA CLARA VALLEY WATER DISTRICT

ASSESSMENT OF CONTAMINATION FROM LEAKS OF
HAZARDOUS MATERIAL IN THE SANTA CLARA VALLEY
GROUNDWATER BASIN

BASIN SENSITIVITY MAP

SCALE IN FEET

DECEMBER 1984

FIGURE V-4

BASIN SENSITIVITY SCALES

FIGURE V-5 MUNICIPAL WELL SCALE

SCORE	0	3	4	6	10
NUMBER OF MUNICIPAL WELLS PER SECTION	0	1-2	3	4	≥ 5

FIGURE V-6 PRIVATE WELL DENSITY SCALE

SCORE	0	3	6	10
NUMBER OF PRIVATE WELLS PER SECTION	0	1-3	4-7	≥ 8

FIGURE V-7 WELL PRODUCTION SCALE

SCORE	1	3	5	6	8	10
WELL PRODUCTION PER SECTION (ACRE FEET)	≤ 2.2	≥ 2.2 ≤ 22	> 22 ≤ 220	> 220 ≤ 660	> 660 ≤ 2200	> 2200

FIGURE V-8 CONDUITS OF POTENTIAL CONTAMINANT MIGRATION SCALE

SCORE	0	1	2	5	7	10
NUMBER OF CONDUITS PER SECTION	0	1-4	5-8	9-16	17-23	> 23

FIGURE V-9 AREAL GEOLOGY SCALE

SCORE	0	6	8	12	16	20
AREAL GEOLOGY	B	QT_S	Q_{OBM}	Q_{OF}	Q_B	Q_{YAF}

LEGEND

B - UNDIFFERENTIATED BEDROCK UNITS, QT_S - SANTA CLARA FORMATION, COMPACTED TO LIGHTLY CONSOLIDATED, Q_{OBM} - OLDER SAN FRANCISCO BAY MUD, Q_{OF} - OLDER ALLUVIAL FAN DEPOSITS, Q_B - INTERFLUVIAL BASIN DEPOSITS, Q_{YAF} - YOUNGER ALLUVIAL FAN DEPOSITS

FIGURE V-10 HYDROGEOLOGIC FEATURES SCALE

SCORE	0	10	12	16	18	20
HYDROGEOLOGIC FEATURES BY SECTION	O,M	SI	>50% CONFINED	<50% CONFINED	<50% FOREBAY	>50% FOREBAY

LEGEND

O - OUTSIDE BASIN BOUNDARY

SI - AREA OF SALTWATER INTRUSION

M - AREA OF HISTORIC MARSHLANDS OF SOUTH SAN FRANCISCO BAY

The last scale, as shown in Figure V-10, measures the basin's sensitivity in terms of its hydrogeologic features. For the Santa Clara Valley subbasin, these features include areas affected by saltwater intrusion, areas where the major aquifers exist under confined conditions, and areas used for groundwater recharge. Permeability as represented by areal geology and hydrologic basin features represents the chief factor in determining basin sensitivity. As such, these scales are given weightings twice that of the other scales.

Applying these scales to the Santa Clara Valley subbasin results in the basin sensitivity map shown in Figure V-4. This map illustrates the sensitivity of each section within the subbasin to groundwater pollution. Review of the map indicates that the most sensitive areas of the basin are in the central portions of the basin. In general, these areas are where the majority of the groundwater pumping occurs, the largest number of wells occur, and where the most permeable soils exist. These areas also happen to be where the largest number of sites with contaminants are located.

The map presents a graphical means for depicting local groundwater usage, and areal geology and hydrogeologic features in terms of a range of basin sensitivity to pollution. A basin sensitivity map can be useful in establishing priority areas where contaminant source identification, and the permitting and inspection of existing industrial facilities are important. The Basin Sensitivity map together with the land use map shown in Figure III-10 may also be useful in planning the location of new facilities.

VI. SUMMARY AND CONCLUSIONS

A number of conclusions can be drawn from the results of this study. What follows is a presentation of these conclusions as they relate to the assessment methodology, groundwater basin, and results from the application of the assessment methodology.

ASSESSMENT METHODOLOGY

1. The assessment methodology is intended only as a standardized approach for recording hydrogeologic factors and chemical contamination factors and relative ranking of the threat to the groundwater resource based on data reduced to this standardized format.

2. The methodology provides a first round approximation of the degree of contamination potential for a site or group of sites relative to other sites.

3. Use of the risk matrix provides a useful framework for allowing several sites to be graphically compared. A site position in the matrix indicates the degree of contamination potential, which in turn reflects the immediate need to cleanup the contamination. The results can be used to assist in setting priorities for regulatory response and for allocating limited resources among a multitude of competing sites.

4. In addition to providing a relative ranking of sites and indicating where urgent remedial action is appropriate and should be considered, the site sensitivity scale can be utilized to identify sites which should have priority for preventative regulatory activities because of the danger of potential pollution. For example, a high site sensitivity score indicates site conditions very sensitive to groundwater pollution. If hazardous materials are utilized on the site, degradation of the groundwater poses a significant threat. Based on the overall score, however, such sites do not warrant immediate action but should receive continued and close monitoring.

5. The assessment methodology is designed to be a simple system that can be utilized as an initial site screening tool with the minimum amount of data, however, it will function best if site scores and rankings are continually updated as significant new data becomes available.

SANTA CLARA VALLEY GROUNDWATER SUBBASIN

1. As noted under hydrogeology, the groundwater basins can generally be divided into practical hydrographic units based upon the character of the aquifer-aquitard systems and upon the occurence, recharge and movement of groundwater. These units in

the Santa Clara Valley subbasin are noted as the "Forebay", "Upper Aquifer Zone", and "Lower Aquifer Zone". Coyote Valley is essentially one unconfined unit analogous to the forebay unit of the Santa Clara Valley subbasin.

2. Any accidental hazardous materials spill occurring in the forebay, the principal recharge unit in the basin, can leach directly to the groundwater which, for practical purposes, occurs unconfined. Depth to groundwater over much of the forebay is relatively shallow. It is generally located within 50 feet of the surface except in certain areas along the northwestern forebay area and in the area just down gradient of the Edenvale Gap where it is located at greater depths.

3. Once contaminants enter the groundwater in the forebay, they will migrate freely, as stratification is usually weak and the permeabilities are relatively high.

4. Depths to groundwater within the upper aquifer zone are generally shallow, within 30 feet of the ground surface. Much of the area within this zone is covered by a clay cap of varying thickness, usually about 20 feet. A relatively small annual volume of water continues to be pumped from this zone, principally for domestic or agricultural purposes.

5. Twelve hundred and five (1,205) private wells and 258 municipal wells, as defined within this study, are located within the subbasin. Also, approximately 850 inactive wells and 3,000 destroyed wells are located within the subbasin. In addition, the SCVWD has estimated that there may be as many as 12,000 additional abandoned and/or inactive wells throughout the basin. An unknown number of these wells are perforated in both the upper and lower aquifer zones allowing for the potential of contaminant migration to deeper aquifers which are used as the main source of municipal water supply.

6. The lower aquifer zone, within the interior of the subbasin, represents the principal pumping source of groundwater used for municipal water supply.

7. The highest density of private wells appears to be in the older subdivisons of Palo Alto, and Mountain View, with pockets in the northern and downtown areas of San Jose, portions of Campbell, and in southern San Jose adjacent to Alamitos.

8. The highest density of wells (i.e., active, inactive, destroyed) appears to be in Palo Alto, and Mountain View, with pockets in northern and downtown araes of San Jose, portions of Campbell, and in southern San Jose adjacent to Alamitos.

9. The majority of groundwater pumping is conducted on the southern edge of the confined zone of the Santa Clara Valley subbasin, along Highway 280.

10. Light industrial development generally follows the highway

corridors along U.S. 101, 17, and 680 located in the northern sections of the Santa Clara Valley subbasin.

ASSESSMENT RESULTS

1. There are 105 known sites with organic solvent contamination within the study area with 81 (69 %) of these sites classified as on-going (i.e., investigation and site clean-up underway). The remainder are classified as sites that the Regional Board is not requiring further action beyond semi-annual monitoring at the present time.

2. One hundred and five (105) case summaries of all the known sites with solvent contamination (i.e., sites classified as on-going and NA) located in the Santa Clara Valley have been prepared which include information on the site description (i.e., tanks, materials stored, etc.), geology, contamination, case chronology, and current Regional Board investigation status.

3. The most frequent synthetic compounds found are considered volatile organic compounds (VOCs). These compounds include TCE, PCE, TCA, Freon, Xylene, Toluene, Methylene Chloride, and Benzene to name a few of the more prevalent ones.

4. Chemical summaries including information on structure, physical parameters, acute and chronic toxicity, and available standards were prepared.

5. Review of the summaries indicates that data is generally available for all the factors listed above except for dermal exposure data and carcinogenicity data.

6. Plume maps of general organic contamination were prepared for the sites with solvent contamination located in the study area. In general, these maps indicate that contaminant data is predominately available for the shallow groundwater and is limited for deeper groundwater. Eight plumes in the shallow groundwater aquifer have been defined down to levels of less than 10 ppb. To date, the largest well defined plumes in the shallow groundwater and the groundwater below the first aquitard are the IBM and Fairchild Camera plumes in south San Jose. For the majority of sites, additional data is necessary in order to define the extent of pollution in the shallow groundwater as well as deeper groundwater.

7. The plotting of the site scores on the risk matrix indicates:

   -that the highest risk sites are in the city of San Jose, and

   -that the sites that were classified as NA are, in general, the sites with lowest scores.

8. A summary of the scores for each site was prepared in order to address data uncertainty and aid in identifying data gaps and areas where additional work may be necessary. In general, data on the basin hydrogeology and contaminant properties were sufficient. Data on the magnitude of contamination and barrier to contaminant migration at the site had a high degree of uncertainty.

9. A basin sensitivity map to groundwater pollution was developed using six general parameters. The basin sensitivity map can be useful in establishing priority areas where contaminant source identification, and the permitting and inspection of existing industrial facilities is important. It may also be useful in planning the location of new industrial facilities.

VII. FUTURE TASKS

What follows is a brief description of the tasks that we believe should be considered by the Regional Board for future action.

1. The methodology as presently developed applies to organic solvents. The methodology should be modified to allow for application to other contaminants such as fuels and metals. Once the methodology is modified consideration should be given to application to all sites that the Regional Board staff is presently working on.

2. Investigate the possible development of a two phased site screening approach for new sites using the Basin Sensitivity Map and the assessment methodology.

3. Develop Regional Board office implementation guidelines for the routine screening of new sites.

4. Develop guidelines for the implementation of the assessment methodology that cover use of the methodology for the screening of new sites, updating of site ratings when new data becomes available that reduces rating uncertainty, and updating site ratings to incorporate site mitigation measures.

5. Assemble groundwater data on the 29 additional basins located in the San Francisco Bay Region and put it in the proper format (see Section III) for use with the risk assessment methodology presented in Section II of this report. Also, prepare basin sensitivity maps for selected basins following the methdology presented in Section V of this report. Consideration should be given to preparing Water Quality Control Plan amendments when these results are available.

APPENDICES

APPENDIX 1

APPENDIX 1

SUMMARY OF CONTAMINATION AT SITES

LEGEND

- > / < : GROUNDWATER CONTAMINATION / SOIL CONTAMINATION
- > PRESENT AT CONCENTRATION >1 PPM
- < PRESENT AT CONCENTRATION <1 PPM
- — NOT TESTED
- ○ NOT DETECTED

Name of Site	1,1,1 - TCA	FREON	TCE	XYLENE	CHLOROFORM	PCE	1,2 - DCE	TOLUENE	1,1 - DCA	1,1 - DCE	METHYLENE CHLORIDE	ETHYLBENZENE	BENZENE	ACETONE	METHYL ETHYL KETONE	PHTHALATE ESTERS	ISOPROPANOL	1,2,4 - TCB	PHENOL	VINYL CHLORID.	PCBs	STODDARD SOLVENT	DIESEL FUEL	
CUPERTINO																								
Hewlett Packard			>/<	</<		</—																		
Kaiser								0/<															0/>	
Siemens	>/>	</—	>/>	</<		</<		</>	>/<	</>		0/>	0/<					</>	—/>	</0				
Tandem (Four Phase)		0/<	0/>	0/>		0/<	0/<	0/<		0/<		0/>	0/<											
Timex	—/<	—/>	—/>	—/>	—/>	—/>		—/<			—/>	—/>	—/>	—/>	—/>		—/>							
Zilog						—/<		—/<																
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LOS GATOS																								
Becton-Dickinson																>/>						>/>		
MILPITAS																								
Ford	</—		</—				</<	</>	</—		</<	>/>	</<		</—	>/<				</—	</<			
Great Western	>/>		>/>	0/<		>/>	>/<	>/<	>/<	>/>	>/>		</<											
Harris Microwave					</<						</<			0/<			0/>							
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APPENDIX 1 - SUMMARY OF CONTAMINATION AT SITES

Name of Site	1,1,1 - TCA	FREON	TCE	XYLENE	CHLOROFORM	PCE	1,2 - DCE	TOLUENE	1,1 - DCA	1,1 - DCE	METHYLENE CHLORIDE	ETHYLBENZENE	BENZENE	ACETONE	METHYL ETHYL KETONE	PHTHALATE ESTERS	ISOPROPANOL	1,2,4 - TCB	PHENOL	VINYL CHLORIDE	PCBs	STODDARD SOLVENT	OIL AND GREASE	
MOUNTAIN VIEW																								
Fairchild	>/>	</-	>/>	>/<	</<	</<	>/<	</<	</<	>/<	</<	</>		>/-			>/0							
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APPENDIX 1 - SUMMARY OF CONTAMINATION AT SITES

Name of Site	1,1,1 - TCA	FREON	TCE	XYLENE	CHLOROFORM	PCE	1,2 - DCE	TOLUENE	1,1 - DCA	1,1 - DCE	METHYLENE CHLORIDE	ETHYLBENZENE	BENZENE	ACETONE	METHYL ETHYL KETONE	PHTHALATE ESTERS	ISOPROPANOL	1,2,4 - TCB	PHENOL	VINYL CHLORIDE	PCBs	BUTYL CELLOSOLVE
SAN JOSE																						
Burke																o/<						
DAP	</-	</-		</-	</-	</-		</-	</-		</-			</-		</-						
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Safeway Chemical					o/<			o/<				o/<	o/<									
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APPENDIX 1 - SUMMARY OF CONTAMINATION AT SITES

Name of Site	1,1,1 - TCA	FREON	TCE	XYLENE	CHLOROFORM	PCE	1,2 - DCE	TOLUENE	1,1 - DCA	1,1 - DCE	METHYLENE CHLORIDE	ETHYLBENZENE	BENZENE	ACETONE	METHYL ETHYL KETONE	PHTHALATE ESTERS	ISOPROPANOL	1,2,4 - TCB	PHENOL	VINYL CHLORIDE	PCBs	PAINT THINNER	CARBON TETRACHLORIDE	
SANTA CLARA																								
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Applied Materials	>/>	</<	</<		</–	</<			>/>	>/>										</–				
Avantek	>/0	</–	>/0	>/–		</–		</–	</–		>/–	>/–		>/–	</–					</–				
Container Corp.				</–				>/0				</–	</–		</–									
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Monsanto	</–	</–	</–	</–				</–				</–	</–											
NSC	>/>	>/–	>/<	>/>		</0	>/0	</0	>/0	>/0														
Pacific Nursery																						>/>		
Prec. Monolithics	>/<	>/<	>/<	>/–	</–	</–	>/<	</–	</–	</–	</–	>/>		>/–			>/–	</–						
Safety-Kleen					</–	</–			</–														</–	
Scientific Gas	</0										</0													

APPENDIX 1 - SUMMARY OF CONTAMINATION AT SITES

Name of Site	1,1,1 - TCA	FREON	TCE	XYLENE	CHLOROFORM	PCE	1,2 - DCE	TOLUENE	1,1 - DCA	1,1 - DCE	METHYLENE CHLORIDE	ETHYLBENZENE	BENZENE	ACETONE	METHYL ETHYL KETONE	PHTHALATE ESTERS	ISOPROPANOL	1,2,4 - TCB	PHENOL	VINYL CHLORIDE	PCBS				
SANTA CLARA (cont.)																									
Sperry	</–	</–	</–						</–	</–															
Synertek	>/<	>/–	>/<	>/<	0/<	</0	</<	</<	</<	</<		</<	</0	>/>				</<	</0						
Technical Coatings	</–			>/>	</–			>/>	</–		>/0	>/>	>/>		>/–				</–						
SUNNYVALE																									
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Applied Technology	>/>	</<		0/<	</0	0/<	</0		</0	</<	0/<														
Bell Industries		</0	</0													</0									
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Data General		</<	</<	</0	</<		</<					</0													
Exar-Integrated	</0	</0			</0		</0				</0					</–									
Hewlett Packard	</0				</0		</<		</0	</0						–/>			–/<						
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APPENDIX 1 - SUMMARY OF CONTAMINATION AT SITES

Name of Site	1,1,1 - TCA	FREON	TCE	XYLENE	CHLOROFORM	PCE	1,2 - DCE	TOLUENE	1,1 - DCA	1,1 - DCE	METHYLENE CHLORIDE	ETHYLBENZENE	BENZENE	ACETONE	METHYL ETHYL KETONE	PHTHALATE ESTERS	ISOPROPANOL	1,2,4 - TCB	PHENOL	VINYL CHLORIDE	PCBs
SUNNYVALE (cont.)																					
MMI	</<	</0	>/0	>/>	</<	>/>	>/0	</>	</0	</0		>/>	</<	>/>			>/>		</–		
Precision Media	</0	</0	</0	</–		</–	</0	</–	</0	</0		</0			>/>					</0	
Signetics - 740	</0		>/<		0/<	</<	</0	0/<			0/<		>/<								
Signetics - 811	>/>	0/<	>/>	>/>	–/<	>/>		>/>					>/>					</–	>/>		
Signetics - 860	</–	</–	>/–		</–	</–	>/–		</–	</–		>/–				</–					
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UTC	>/>	>/<	>/>			0/<	>/>		</<	</0	0/<										
Verbatim							</0	</<			>/0		</0		>/–						
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Zymos	</0	</0	</<	0/<		</0	</0		</0				</0								

APPENDIX 2

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APPENDIX 3

APPENDIX 3

SCALE SCORES - ON GOING (OG) SITES

SITE SENSITIVITY FACTORS

CONTAMINANT SEVERITY FACTORS

FACILITIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(14a)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
CUPERTINO																								
HP	3	3.8	9.5	8.8	0	1.8	2.5	10	10	10	2-6	0-5	0-5	5	4.9	3	10	10	4.5	2	12	0.5	0-10	3
Siemens	6.5	4.5	8	9.6	0	1.8	5	10	9.9-10	9.9-10	2-6	0-5	0-5	0-10	5.4	3	10	10	4.5	2	12.5	12.5	0.1-10	10
Tandem (Four Phase)	8.3	4	8	9.8	0	1.6	5	3	9.7	9.7	0-4	0-2	0-2	0-10	3.6	3	10	10	4.5	2	0	20	0.1-10	10
Timex	7	4.5	8.5	8	0	2	0	6.5-10	10	10	0-10	0-5	0-5	0-10	4	3	10	10	6	2	0-10	20	0-10	10
LOS GATOS																								
Becton-Dickinson	0	0	9.5	0.1	0	1.5	0	10	10	10	4-6	2-3	0-5	10	4.3	10	10	10	0-5.5	2-10	14.5	20	0.5-10	6
MILPITAS																								
Ford	0.2	0.4	7	4	0	6.6	0	10	6.7-10	6.7-10	0-4	0-5	0-5	0-10	9.2	10	10	10	0-5.5	2-10	1.7	20	4-10	10
Great Western	0	0.5	1.5	0	0	2	0	10	9-10	9-10	0-4	0-2	0-5	3	3	3	10	10	4.5	2	20	17	1.5-10	10
Jones	0	1.5	9	3.7	0	7.4	0	10	8.6-10	8.6-10	0-4	0-5	0-5	2	8.1	3	10	10	4.5	2	20	1.7	1.4-10	10
Pierce & Stevens	0	0.5	1.5	0	0	2	0	10	9-10	9-10	0-4	0-5	0-5	2	3	3	10	10	4.5	2	15.5	0.1	0.2-10	10
MOUNTAIN VIEW																								
Fairchild	0	3.5	10	6.5	0	6	0	10	10	10	0-4	0-2	0-5	2	10	3	10	10	4.5	2	20	20	5-10	10
HP	0	1	6	6.5	0	7	0	10	8-10	10	4-6	0-5	0-5	2	8	3	10	10	4.5	2	0.1	0.1	0.3-10	9
Intel	0	3.5	8.5	7.5	0	7	0	10	10	10	0-4	0-5	0-5	3	10	3	10	10	4.5	2	20	13	1.3-10	10
Moffett NAS	0	0	0	0	0	0	0	10	8-10	8-10	0-4	0-5	0-5	2	0	3	10	10	4.5	2	14	2	1.4	10
NEC	0	1.5	9.5	6	0	3	0	10	8-10	8-10	0-4	0-5	0-5	0-10	4	3	10	10	4.5	2	11	9	0.4-10	10
Raytheon	0	2.5	8	7	0	7	0	10	8-10	8-10	0-4	0-2	0-5	2	10	3	10	10	4.5	2	20	19	1.2-10	10
Siltec	0	2	6	6.5	0	5	0	10	8-10	8-10	0-4	0-5	0-5	0-10	9	3	10	10	4.5	2	18.5	6	0.2-10	9
Teledyne	0	1.3	10	4	0	10	0	10	9.9-10	10	0-4	0	0-5	2.5	10	3	10	10	4.5	2	15	2.5	2-10	10
PALO ALTO																								
Aydin	0	0	2	0.5	0	8.6	0	9.5-10	10	10	0-10	0-5	0-5	0-10	2.3	10	10	10	0	6-10	0-20	14.5	0-10	10
Dura-Bond	0	0	7	2	0	10	0	10	10	10	0-4	0-5	0-5	0-10	5.5	3	10	10	4.5	2	7	0-20	0.3-10	10
Fairchild	0	0.2	4	3	0	4.2	0	10	10	10	0-4	0-5	0-5	8.5	1.8	3	10	10	4.5	2	20	20	1-10	10
HP Deer Cr	0	0	0	3.5	0	1.1	0	10	10	10	0-4	0-5	0-5	10	0.4	3	10	10	4.5	2	20	13	0.5-10	9
395 PM	0	0	8	2.5	0	10	0	10	10	10	0-4	0-5	0-5	0-10	7.8	3	10	10	4.5	2	0	2	0-10	6
640 PM	0	0	7.5	1	0	6.7	0	10	10	10	0-4	0-5	0-5	0.5	2.5	3	10	10	4.5	2	20	0	1-10	10
1501 PM	0	0	1.6	0.5	0	3.3	0	10	10	10	0-4	0-2	0-5	10	1.2	3	10	10	4.5	2	7.7	20	1-10	10
Stanford Cleaners	0	0	8	2.1	0	10	0	10	10	10	0-4	0-5	0-5	0-10	6.4	0-10	0-10	0-10	0-10	0-10	0.5	20	0-10	1

APPENDIX 3

SCALE SCORES - ON GOING (OG) SITES

FACILITIES	SITE SENSITIVITY FACTORS															CONTAMINANT SEVERITY FACTORS								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(14a)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
SAN JOSE																								
Fairchild	10	4	10	10	0	2.1	2.5	10	10	10	0.5-4	0.5-2	0.5-2	2.2	9.1	3	0-10	10	4-5	2-3	20	20	3.7	10
IBM Cottle Rd	10	5	10	8.5	0	6.5	5	10	10	10	0-4	2-3	0.5-2	2.5	8.3	3	0-10	10	4-5	2-3	20	20	10	10
Lorentz	9.5	4	9.5	10	5	10	5	10	5-10	5-10	0	0-5	0-5	1	9	3	10	10	4.5	2	10	4	0.1-10	10
Magnex	9	2	10	10	5	4.8	2.5	10	10	10	0-4	0-5	0-5	0-10	8.1	5	0-10	0-10	0	6.5	0	16	0-10	6
Solvent Service	10	4	9.5	9	5	10	2.5	10	6-10	6-10	0-4	0-5	0-5	7.5	10	3	10	10	4.5	2	20	20	0.3-10	10
UTC	0-10	0-5	0-10	0-10	0-10	0-10	0-5	10	0-10	0-10	0-4	0-5	0-5	5-10	0-10	3	10	10	10	0	20	0-20	1-10	8
Van Waters	8	0	8	5.5	0	4	2.5	10	6-10	10	0-4	0-5	0-5	2	9.3	3	10	10	8-10	0	20	20	0.6-10	10
SANTA CLARA																								
AMI	5	4	8	9	0	2	5	10	10	10	0-4	0-5	0-5	0-10	6.2	3	10	10	4.5	2	0.7	3	0.5-10	10
Applied Materials	0	2.7	10	5.5	0	1	0	10	6-10	6-10	0-4	0-5	0-5	3.5	6.3	3	0-10	10	4-5	2-3	16	20	1.3-10	10
Avantek	0	2	6	5.7	0	1	0	10	5-10	5-10	0-4	0-5	0-5	0-10	6.5	3	0-10	10	4-5	2-3	20	0-20	0-10	10
Dysan 5200	0	0	9	0	0	1	0	10	6-10	6-10	0-2	0-5	0-5	1	3.6	1	10	10	10	0	20	1	0.1	4
5440	0	0	9	0	0	1	0	10	6-10	6-10	0-2	0.5	0.5	1.5	3.6	1	0-10	0-10	10	0	20	20	0.1	6
Fairchild	3	1	10	6.5	0	1.7	2.5	10	5.5-10	5.5-10	0-1	0-5	0-5	4	8.5	3	10	10	4.5	2	11	0.2	0.5-10	10
Intel SCIII	0	2	10	5.5	0	1	0	10	6-10	6-10	0-4	0-5	0-5	5	7.3	3	10	10	4.5	2	5	0.5	0.4-10	10
Magnetics	0	3.5	10	5.5	0	1	0	10	6-10	6-10	0-4	0-5	0-5	5	6.3	1	0-10	10	4-5	2-3	2	0	0.7	10
MMI	0	2	10	7	0	2	0	0	6-10	6-10	0-4	0-5	0-5	0-10	7.8	3	10	10	3-4	2.5-3	0.1	0-20	0.2-10	5
Mag Peripherals	0	1	6	5.5	0	1	0	10	6-10	6-10	0-4	0-5	0-5	0-10	6.9	0-10	0-10	0-10	4	3	14	0	1	10
Memorex	8	2	8	8.5	5	2	0	10	6-7	6-9.5	0-4	0-2	0-5	0.5	6.7	3	0-10	3	1-3.5	3.5-4	20	0-20	0.6-10	10
Monsanto	2	3.5	10	8	0	1.8	2.5	10	6-10	6-10	0-4	0-5	0-5	2	7.9	3	0-10	3	1-3.5	3.5-4	9	0-20	0-10	10
NSC	0	4.5	10	7	0	1.4	0	10	7-10	7-10	0-4	0-5	0-5	0-10	5.8	3	0-10	10	4-5	2-3	20	1.5	2-10	10
Pac Nurs Pots	1	4	8	8	0	1	0	10	6-10	6-10	0-4	0-5	0-5	0-10	7.5	0-10	0-10	0-10	0-10	0-10	13	18	0-10	2
Precision Mono	3	2	9	6	0	1	2.5	10	6-10	10	0-4	0-5	0-5	1	8.7	3	10	10	4.5	2	19	5	1-10	10
Safety-Kleen	9	0.8	10	7	5	2.3	5	10	6-10	6-10	0-10	0-5	0-5	0-10	9.3	3	10	10	6	2	6.7	0-20	0-10	6
Spectra Physics	1	2	7	6	0	1.2	0	0-10	5-10	5-10	0-10	0-5	0-5	0-10	7.4	1	0-10	3	10	0	0-20	3	0-10	2
Synertek	0.5	1	7	6	0	1	0	10	6-10	6-10	0	0-5	0-5	2	7.6	3	10	10	4.5	2	11	8.5	0.5-10	10
Tech Coatings	2	4	9	8	0	1.3	0	10	6-10	6-10	0-10	0-5	0-5	3	8.1	3	0-10	3	1-3.5	3.5-4	20	20	0.3-10	10
SUNNYVALE																								
AMD 901	0	3.5	9.5	6	0	2	0	10	7-10	7-10	0-4	0-5	0-5	2.5	6.3	3	10	10	4.5	2	20	15	2.4-10	10
915	0	3.5	7	2.5	0	2	0	10	7-10	7-10	0-4	0-5	0-5	2.5	6.3	3	10	10	4.5	2	12	10	2.4-10	10
Ampex	0	2.3	10	0.5	0	2	0	10	7-10	7-10	0-10	0-5	0-5	3.5-7.5	7	3	10	10	4.5	2	11	5	0.2-10	8

APPENDIX 3

SCALE SCORES - ON GOING (OG) SITES

FACILITIES	SITE SENSITIVITY FACTORS															CONTAMINANT SEVERITY FACTORS								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(14a)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
SUNNYVALE con't																								
Circo	0	1.8	10	0.2	0	2	0	10	6-10	6-10	0-10	0-5	0-5	0-10	3.6	10	10	10	0-5.5	2-10	1	0	0-10	6
Data General	0	4	7.5	6	0	5	0	10	7-10	7-10	0-4	0-5	0-5	2.5-4.5	9.5	3	10	10	4.5	2	2	0.1	0.3-10	8
Exar-Integrated	0	1.5	7	0.5	0	2.4	0	10	6-10	6-10	0-10	0-5	0-5	0-10	4.8	3	10	10	4.5	2	5	0	0-10	9
HP	0	2.5	8	6.5	0	2	0	10	6-10	6-10	0-10	0-5	0-5	0-10	5.8	10	10	10	0-5.5	2-10	0	12	0-10	8
InPrint	0	2.5	2.5	6	0	2	0	10	6-10	6-10	0-10	0-5	0-5	0-10	6	3	10	10	3-4	2.5-3	0.5	1.2	0-10	7
Intersil	0	0	7	0	0	1	0	10	5-10	5-10	0-10	0-5	0-5	0-10	3.1	1	0-10	0-10	8	0	10	0-20	0-10	7
KTI	6	9.5	0	9	0	2	2.5	10	6-10	6-10	0-10	0-5	0-5	2.5	7	3	10	10	3-4	2.5-3	0.1	0-20	0.2-10	5
Micrel (Adv LSI)	0	2	5.5	5	0	5	0	10	6-10	6-10	0-10	0-5	0-5	0-10	6.8	3	0	10	8	0	20	12	0-10	10
MMI	0	3.5	8	5	0	1	0	10	9-10	9-10	0	0	0-5	5	3.4	3	0-10	3	1-3.5	3.5-4	20	20	0.2	10
Precision Media	0	0	0	0	0	0	0	10	6-10	6-10	0-10	0-5	0-5	0-10	2.9	1	0-10	0-10	10	0	20	16	0-10	10
Signetics 740	0	4.5	9.5	7.5	0	2	0	10	8-10	8-10	0-4	0-5	0-5	0-10	5.3	3	10	10	4.5	2	10	0.1	0.3-10	5
811	0	3.5	10	6	0	3	0	10	9-10	9-10	0-4	0-2	0-5	3	7.8	3	10	10	4.5	2	20	20	2-10	10
860	0	4.5	8.5	8	0	2	2.5	10	6.5-10	6.5-10	0-4	0-5	0-5	3	6.8	3	10	10	4.5	2	11	0-20	0.4-10	10
TRW	0	2.5	10	5.5	0	2	0	10	8-10	8-10	0-4	0-5	0-5	2.5	7.2	3	10	10	4.5	2	20	20	2.4-10	10
UTC	0	4	10	2	0	5	0	10	6.7-10	6.7-10	0-4	0-5	0-5	2	4.5	1	0-10	0-10	8	0	15	12	1-10	10
Verbatim	0	3.5	7.5	6.5	0	6	0	10	8-10	8-10	0-4	0-5	0-5	2.5-4.5	9.5	1	0-10	10	9	0	20	0	0.1-10	10
Westinghouse	7	4	1.5	8	0	3	2.5	10	9-10	9-10	0-4	0-5	0-5	8	6.9	1	10	0-10	0	6-10	14.5	20	0.9-10	5
Xidex	0	3.5	7.5	6.5	0	6	0	10	8-10	8-10	0-4	0-5	0-5	2.5-4.5	9.5	1	0-10	10	9	0	20	11	0.1-10	10
Zymos	0	4.5	7.5	1	0	5	0	10	7-10	7-10	0-4	0-5	0-5	2.5-4.5	8.8	3	10	10	4.5	2	3	0.1	0.3-10	8

APPENDIX 3

SCALE SCORES - NO FURTHER ACTION (NA) SITES

FACILITIES	SITE SENSITIVITY FACTORS															CONTAMINANT SEVERITY FACTORS								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(14a)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
CUPERTINO																								
Kaiser Aluminum	0	0	8	5	0	2	0	0	0	0	4-6	0	0	0	1	3	0-10	10	3.5	3.5	0	0.1	0-10	2
Zilog Bridge	1.6	0	7	7.5	0	0.5	0	0-10	0-10	0-10	10	0-5	0-5	0-10	3.8	3	0-10	10	3.5	3.5	0-20	0.2	0-10	2
Inc	1.6	0	7	7.5	0	0.5	0	0-10	0-10	0-10	10	0-5	0-5	0-10	3.8	3	10	10	3-4	2.5-3	0-20	0.1	0-10	3
MILPITAS																								
Harris Microwave	5	2	9.5	6	0	6	5	10	5.5-10	5.5-10	0-4	0-5	0-5	1.5-2.5	7	1	10	10	10	0	0	0	0-10	3
LSI Logic	4	2	9.5	6	0	3	5	10	5.5-10	5.5-10	0-4	0-5	0-5	0-10	7	0-10	0-10	0-10	4	3	0.1	0.1	0-10	1
PALO ALTO																								
Beckman	0	0	4	0.5	0	5.5	0	[illegible]-10	10	10	0-10	0-5	0-5	0-10	1.9	0-10	0-10	0-10	0-10	0-10	0-20	20	0.1	1
Watkins Johnson	0	0	9	2.8	0	4.8	0	10	10	10	0-4	0-1	0-1	4.5	2	3	10	10	4.5	2	11	0	1.5-10	10
SAN JOSE																								
Burke	2	3.5	7	10	0	8	5	10	5.5-10	5.5-10	0	0-5	0-5	0-10	10	10	10	10	0-5.5	2-10	0	4	0-10	3
DAP	2	1.5	8	8.5	5	2	2.5	10	5-10	5-10	0-10	0-5	0-5	0-10	9.1	1	0-10	10	9	0	3	0-20	0-10	10
Economics Lab	10	1	8.5	8.5	1	2.3	0	10	4-10	4-10	0-10	0-5	0-5	0-10	9.2	3	0-10	0-10	10	0	0	5	0-10	2
HP	4	2	9	7.5	0	2	2.5	1	5	5	0-4	0-5	0-5	0-10	9.8	10	10	10	0-5.5	2-10	0	0.1	0-10	4
IMP	2	4	9.5	5	0	5	2.5	10	6-10	6-10	0	0-5	0-5	0-10	8.5	1	0-10	10	9	0	0.2	0.3	0.1-10	3
Qume	0	0.5	8.5	3	0	10	0	10	5.5-10	5.5-10	0-10	0-5	0-5	0-10	10	1	0-10	10	9	0	0-20	1.8	0-10	3
Safe-Way Chemical	2	4.5	8	6.5	0	2	0	10	5-10	6-10	0-4	0-5	0-5	0-10	3.7	3	10	10	6	2	0	0.1	0-10	5
U.S. Cellulose	7.5	4	9	10	0	5	5	10	5-10	6-10	0-4	0-5	0-5	0-10	10	3	0-10	10	4-5	2-3	0.2	0	0.1-10	3
SANTA CLARA																								
Container Corp	1	4	10	8	0	1	0	8.5	5-10	5-10	0-10	0-5	0-5	0-10	7.5	3	0-10	10	3.5	3.5	0	14	0-10	5
Dysan 5301	0	0	9	0	0	1	0	10	6-10	6-10	0-10	0-5	0-5	1	3.6	1	10	10	10	0	10	0-20	0.1	1
Scientific Gas	8.5	1	10	7	5	2.3	5	10	6-10	6-10	0-10	0-5	0-5	0-10	9.3	3	0-10	10	4-5	2-3	0.1	0	0-10	3
Sperry Univac	0	4	6	5.5	0	1	0	10	6-10	6-10	0-10	0-5	0-5	5	6.4	3	10	10	4.5	2	2	0-20	0.5-10	4
SUNNYVALE																								
Amdahl	0	3	7	5.5	0	1	0	10	6-10	6-10	0-10	0-5	0-5	0-10	5.3	5	10	10	6	2	0.2	0-20	0-10	3
Applied Tech	0	1	10	0.1	0	2	0	10	7-10	7-10	0-4	0-5	0-5	10	4.2	3	0-10	10	4-5	2-3	12	13	0.2-10	10
Bell Industries	0	0.7	2	0	0	0	0	10	5.5-10	5.5-10	0-10	0-5	0-5	0-10	2.3	10	10	10	0-5.5	2-10	0.2	0	0-10	3

APPENDIX 3

SCALE SCORES - NO CONTAMINATION (NC) SITES

FACILITIES	SITE SENSITIVITY FACTORS															CONTAMINANT SEVERITY FACTORS								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(14a)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
CAMPBELL																								
Hi Line Paint	2	0.2	1.2	9	0	0	5	0	0	0	0-10	0-5	0-5	0-5	4.7									
CUPERTINO																								
Intersil	1.4	1.8	5	8.5	0	1.9	0	0	0	0	0-4	0-5	0-5	0-10	3.9									
MILPITAS																								
Sierra Chemical	0	0.5	5	0.1	0	1.3	0	0	0	0	0-10	0-5	0-5	0-10	2.8									
SAN JOSE																								
IBM S.10th St	2	5	7	10	5	8	5	0	0	0	0-4	0-5	0-5	0-10	10									
San Jose Graphics	4	4	10	6	0	2	5	0	0	0	0	0-5	0-5	0-10	8.3									
SANTA CLARA																								
Owens Corning	2	3.5	10	6	0	1	0	0	0	0	0-10	0-5	0-5	0-10	8.3									
STC Computer	0	4	9.5	5.5	0	1	0	0	0	0	0-10	0-5	0-5	0-10	5.3									
Tandy	0	4	4	8	0	1.5	2.5	0	0	0	0-10	0-5	0-5	0-10	7.7									
SUNNYVALE																								
Toshiba	0	2	9.5	0.5	0	1	0	0	0	0	0-10	0-5	0-5	0-10	1.8									

APPENDIX 4

Santa Clara Valley Groundwater Basin

Destroyed Wells

Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.
05S1E	31	5	06S1E	16	17	06S1W	3		06S1W	27	14
	32	1		17	16		4	1		28	12
	33			18	12		5			29	17
05S1W	31			19	26		6	0		30	7
	32			20	30		7	1		31	34
	33			21	21		8			32	22
	34			22	12		9	7		33	10
	35			23	3		10	14		34	19
	36	7		24			11	5		35	7
05S2W	36			25	1		12	5		36	9
05S3W	34			26	5		13	10	06S2W	1	
	35			27	12		14	17		2	
	36	1		28	20		15	18		3	
06S1E	3			29	16		16	12		4	
	4	1		30	25		17	10		5	1
	5	4		31	9		18	23		6	3
	6	8		32	25		19	26		7	2
	7	16		33	19		20	3		8	21
	8	6		34	21		21	21		9	60
	9	5		35	12		22	19		10	7
	10			36	7		23	17		11	
	11		06S2E	31	1		24	17		12	
	14		06S1W	1	3		25	21		13	5
	15	14		2	6		26	25		14	4
		68			319			272			254

Well=Township

Destroyed Wells

Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.
06S 2W	15	67	06S3W	13		07S1E	20	9	0752E	17	23
	16	149		14			21	14		18	36
	17	45		15			22	25		19	25
	18	1		18			23	17		20	22
	19	9		19			24	27		21	3
	20	11	07S1E	1	4		25	16		22	
	21	17		2	9		26	23		27	
	22	41		3	9		27	20		28	12
	23	19		4	6		28	5		29	4
	24	22		5	16		29	4		30	2
	25	21		6	12		30	14		31	
	26	28		6			30			31	
	27	19		7	15		31	10		32	
	28	3		8	16		32	2		33	2
	29	8		9	9		33	17		34	
	30	4		10	14		34	2		35	
	31	3		11	1		35	6	07S1W	1	6
	32	7		12	17		36	10		2	10
	33	7		13	18	07S2E	5			3	7
06S3W	1	2		14	12		6	8		4	3
	2			15	28		7	11		5	21
	3			16	5		0	6		6	17
	10			17	4		9			7	6
	11			18	10		15			8	11
	12			19	8		16	1		9	3
		481			213			247			213

Destroyed Wells

Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.
07S1W	10	6	07S1W	34	6	07S2W	27		08S1E	21	15
	11	5		35	6		34			22	8
	12	3		36	6		35			23	2
	13	7	07S2W	1	10		36	13		24	4
	14	1		2	6	08S1E	1	10		25	1
	15	2		3	5		2	12		26	11
	16	12		4	4		3	14		27	9
	17	5		5	2		4	25		28	4
	18	6		6			5	30		29	
	19	5		8			6	4		30	
	20	5		9	4		7	12		33	
	21	8		10	6		8	14		34	
	22	7		11	5		9	25		35	7
	23	9		12	8		10	21		36	6
	24	12		13	1		11	23	08S2E	2	
	25	4		14	9		12	27		3	
	26	8		15	5		13	19		4	
	27	11		16			14	16		5	1
	28	4		21			15	7		6	16
	29	4		22	4		16	28		7	13
	30	8		23	4		17	15		8	9
	31	12		24	1		18	9		9	
	32	3		25	14		19	2		10	
	33	5		26	1		20	16		11	
		152			107			342			106

Destroyed Wells

Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.
08S2E	15		08S3E	32		08S1W24			09S3E	7	
	16	5	08S1W	1	4	08S2W	1	11		8	2
	17	27		2	1		2			9	
	18	12		3	8		3			10	
	19	9		4	3		11			16	1
	20	5		5	20		12	8		17	
	21	4		6	20		13			18	
	22	1		7	5	09S1E	1				
	23			8	19		2				
	24			9	5	09S2E	1	1			
	25			10	9		2				
	26			11	2		3				
	27			12	2		4				
	28	1		13	2		5				
	29			14			6				
	30	1		15	4		10				
	31	5		16	12		11				
	32			17	5		12				
	33			18	1		13				
	34			19			14				
	35			20	1	09S3E	3				
	36			21	5		4				
08S3E	30			22	1		5				
	31			23			6				
		70			129			20			3

Santa Clara Valley Groundwater Basin

Inactive Wells

Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.
05S1E	31	2	06S1E	16	1	06S1W	3	0	06S1W	27	10
	32	2		17	3		4	0		28	4
	33	0		18	3		5	3		29	2
05S1W	31	0		19	9		6	0		30	1
	32	0		20	4		7	0		31	3
	33	0		21	3		8	0		32	1
	34	0		22	2		9	4		33	0
	35	0		23	2		10	7		34	1
	36	0		24	0		11	1		35	4
05S2W	36	0		25	2		12	5		36	1
05S3W	34	0		26	0		13	6	06S2W	1	0
	35	1		27	6		14	1		2	0
	36	2		28	5		15	2		3	1
06S1E	3	0		29	11		16	1		4	0
	4	2		30	8		17	1		5	0
	5	1		31	2		18	1		6	9
	6	2		32	3		19	2		7	4
	7	2		33	5		20	0		8	14
	8	0		34	3		21	2		9	38
	9	0		35	1		22	7		10	5
	10	0		36	1		23	3		11	0
	11	0	06S2E	31	1		24	5		12	1
	14	0	06S1W	1	5		25	2		13	0
	15	3		2	0		26	4		14	0
		17			80			57			99

Well=Township

Inactive Wells

Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.
06S2W	15	8	06S3W	13	1	07S1E	20	7	07S2E	17	7
	16	25		14	0		21	4		18	5
	17	5		15	0		22	7		19	9
	18	3		18	0		23	9		20	5
	19	0		19	0		24	10		21	5
	20	3	07S1E	1	1		25	3		22	0
	21	2		2	1		26	4		27	0
	22	1		3	2		27	11		28	2
	23	1		4	5		28	3		29	4
	24	1		5	15		29	5		30	1
	25	2									
	26	2		6	3		30	0		31	0
	27	1		7	5		31	0		32	0
	28	1		8	2		32	3		33	3
	29	2		9	1		33	6		34	2
	30	5		10	3		34	4		35	0
	31	5		11	1		35	4	07S1W	1	2
	32	0		12	1		36	3		2	4
	33	0		13	4	07S2E	5	1		3	0
06S3W	1	2		14	1		6	6		4	1
	2	1		15	11		7	4		5	1
	3	0		16	2		8	5		6	1
	10	0		17	7		9	0		7	1
	11	0		18	3		15	0		8	0
	12	0		19	4		16	8		9	4
		70			73			107			57

Inactive Wells

Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.
07S1W	10	0	07S1W	34	0	07S2W	27	0	08S1E	21	3
	11	1		35	2		34	0		22	3
	12	1		36	1		35	0		23	4
	13	0	07S2W	1	1		36	3		24	0
	14	0		2	1	08S1E	1	3		25	1
	15	2		3	1		2	0		26	10
	16	0		4	3		3	0		27	3
	17	0		5	1		4	0		28	1
	18	1		6	0		5	4		29	0
	19	0		8	0		6	2		30	0
	20	0		9	0		7	2		33	0
	21	0		10	1		8	1		34	0
	22	1		11	0		9	2		35	7
	23	0		12	0		10	3		36	11
	24	5		13	0		11	8	08S2E	2	0
	25	1		14	3		12	2		3	0
	26	1		15	3		13	0		4	0
	27	0		16	0		14	0		5	0
	28	1		21	0		15	3		6	2
	29	1		22	4		16	5		7	4
	30	1		23	0		17	6		8	5
	31	4		24	0		18	1		9	0
	32	1		25	1		19	4		10	0
	33	3		26	3		20	2		11	0
		24			25			51			54

Inactive Wells

Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.	Well	Sec.	No.
08S2E	15	0	08S3E	32	0	08S1W	24	0	09S3E	7	0
	16	0	08S1W	1	0	08S2W	1	3		8	0
	17	5		2	0		2	0		9	0
	18	0		3	5		3	0		10	0
	19	1		4	2		11	0		16	0
	20	0		5	10		12	6		17	0
	21	1		6	6		13	0		18	0
	22	0		7	3	09S1E	1	0			
	23	0		8	9		2	0			
	24	0		9	2	09S2E	1	0			
	25	0		10	3		2	0			
	26	0		11	0		3	0			
	27	0		12	1		4	0			
	28	0		13	0		5	0			
	29	0		14	0		6	0			
	30	2		15	2		10	0			
	31	10		16	2		11	0			
	32	1		17	6		12	0			
	33	0		18	4		13	0			
	34	0		19	0		14	0			
	35	0		20	0	09S3E	3	0			
	36	0		21	2		4	0			
08S3E	30	0		22	0		5	0			
	31	0		23	0		6	0			
		20			57			9			

APPENDIX 5

Policy Advisory Committee

MEMBER	ALTERNATE
Mr. Daniel Kriege Santa Clara Valley Water District 5750 Almaden Expressway San Jose, California 95118 408-265-2600	Mr. John Sutcliffe
Mr. Dick Balocco San Jose Water Works 374 West Santa Clara Street San Jose, California 95196 408-279-7808	Mr. J.W. Weinhardt Dr. Scott Yoo
Dr. Harvey F. Collins, Deputy Director Environmental Health Division 714 "P" Street, Room 430 Sacramento, California 95814 916-442-2308	Mr. Richard P. Wilcoxon Chief, Toxic Substances Control Division
Mr. Clem Molony IECC (Industry Clean Water Task Force) c/o Tandem Computers 19333 Vallco Parkway Cupertino, California 95014 408-973-7311	____________________
Mr. Roger B. James Regional Water Quality Control Board 1111 Jackson Street Oakland, California 94607 415-464-0516	____________________

Technical Advisory Committee

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Dr. Ron James U.S. Geological Survey 345 Middlefield Road Menlo Park, California 94025	
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Mr. Gil Torres

Citizens Advisory Committee

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Mr. Don Fast, P.E. 3322 Oxford Lane San Jose, California 95117	Mr. Daniel Hernandez
ABAG (Association of Bay Area Governments) Mayor Betsy Bechtel 415 Lowell Ave. Palo Alto, CA 94301	Ms. Lorene Jackson ABAG Hotel Claremont Berkeley, CA 94705